Q.27 Write short note on the following:
    a) Rate constant          b) Rate equation
Q.28 Discuss about holding time and space time in detail.
Q.29 Discuss the effect of change in concentration and temperature on chemical equilibrium.
Q.30 Illustrate the procedure of differential method to analyze the kinetic data
Q.31 Write performance equation and draw graphical representation of constant volume PFR.
Q.32 Derive relationship between concentration and conversion for constant volume batch reactor.
Q.33 Explain CSTR in detail with neat and clean diagram.
Q.34 Describe the concept of activation energy in detail.
Q.35 Distinguish between fixed bed and fluidized bed reactor (any five)

## SECTION-D

**Note:** Long answer type questions. Attempt any two questions out of three questions.          (2x10=20)
Q.36 Classify different types of chemical reactions, Explain and give two examples of each type of reaction.
Q.37 Explain in detail the transition state theory of reaction rate constant.
Q.38 Illustrate the procedure of integral method to analyze the kinetic data. Apply integral method to determine order of irreversible unimolecular type first order reaction.

**5th Sem / Branch : Chemical Engg./Chem. Enggg. (Spl Paint Tech.) Chem Engg (Spl. Poly. Engg.)**
**Sub. : Chemical Reaction Engineering**

Time : 3Hrs.                                   M.M. : 100

## SECTION-A

**Note:** Multiple choice questions. All questions are compulsory          (10x1=10)
Q.1 Chemical reaction involved the presence of catalyst for the completion of reaction is known as_____ reaction.
    a) Heterogeneous          b) Homogeneous
    c) Catalytic               d) Non-Catalytic
Q.2 The reaction in which the rate equation corresponds to the stoichiometric equation is called as _____ reaction.
    a) Elementary             b) Non-elementary
    c) Reversible             d) Irreversible
Q.3 At chemical equilibrium, the rate of forward reaction is _____ the rate of backward reaction.
    a) More than              b) Equal to
    c) Less than              d) None of these
Q.4 Negative sign in the rate equation represents the
    a) Formation of product
    b) Formation of reactant
    c) Disappearance of product
    d) Disappearance of reactant

Q.5 Sum of powers of the concentration terms in the rate equation is called _____ of the reaction.
a) Order b) Molecularity
c) Rate d) None of these

Q.6 Variables affecting the rate of homogeneous reactions are
a) Temperature b) Pressure
c) Concentration d) All of these

Q.7 Half-life period for a first order reaction is _____ the initial concentration of the reactant.
a) Directly proportional to
b) Inversely proportional to
c) Independent of
d) None of these

Q.8 For analyzing simple rate equations _____ method of reaction rate is used
a) Differential b) Integral
c) Half life d) Initial rate

Q.9 Catalyst is a substance which _____ the speed of a chemical reaction.
a) Increases
b) Decreases
c) Either increases or decreases
d) Doesn't change

Q.10 Which of the following reactor gives highest conversion per unit volume of reactor?
a) Batch reactor b) PFR
c) CSTR d) Fixed bed reactor

**SECTION-B**

**Note:** Objective type questions. All questions are compulsory. (10x1=10)

Q.11 Give one example of homogeneous catalysis.

Q.12 Define selectivity of a catalyst.

Q.13 Give full form of MFR.

Q.14 Write one advantage of batch reactor.

Q.15 All liquid phase reaction systems are _____ volume systems. (Constant/ Variable)

Q.16 Write the unit of rate constant for first order reaction.

Q.17 Molecularity of a reaction can never be zero. (True/False)

Q.18 Name any one theory of reaction rate constant.

Q.19 Give one example of reversible reaction.

Q.20 Define chemical equilibrium.

**SECTION-C**

**Note:** Short answer type questions. Attempt any twelve questions out of fifteen questions. (12x5=60)

Q.21 Explain various characteristics of chemical equilibrium in detail.

Q.22 Discuss the concept of rate of reaction in detail.

Q.23 Describe the concept of variable volume batch reactor.

Q.24 Draw neat and clean labeled diagram of a batch reactor.

Q.25 Differentiate between elementary and non-elementary reactions (Any five).

Q.26 Classify different types of catalysis in detail.