

Total No. of Questions : 12]

SEAT No. :

P872

[4659] - 308

[Total No. of Pages : 3

B.E (Chemical Engg.)

CATALYSIS

(2008 Pattern) (Elective - IV) (Semester - II)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section I and 3 questions from Section II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Explain the homogenous catalysis with an example. [8]
b) Explain the application of the catalysis to industrial processes in the fine organic chemical and biochemical industries. [8]

OR

- Q2)** a) Give the characteristics of the catalysis in detail. [8]
b) Explain the heterogenous catalysis with an example. [8]

- Q3)** a) Explain the mechanism of solid-catalysed reaction with suitable example. [8]
b) Give the experimental methods to determine the rate of solid-catalysed reactions. [8]

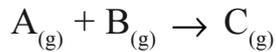
OR

- Q4)** The catalytic reaction $A \rightarrow 4R$ is run at 3.2 atm and 100°C in tubular reactor which contains 0.01 kg of catalyst and uses a feed consisting of partially converted product of 20 lit/hr of pure A and following data was recorded. Determine the rate equation for this reaction. [16]

P.T.O.

$C_{A, in}$ mol/lit-	0.1	0.08	0.06	0.04
$C_{A, out}$ mol/lit-	0.084	0.070	0.055	0.038

Q5) The following mechanism has been proposed for a catalytic reaction.



- $A_{(g)} + X \rightleftharpoons AX$
- $AX + B_{(g)} \rightleftharpoons CX$
- $CX \rightleftharpoons C_{(g)} + X$

when, X indicates an active site on the catalyst. Derive an expression for the rate of reaction if surface reaction is a rate controlling. [18]

OR

Q6) Write short notes on the following. [18]

- Mass transfer in the catalyst.
- Langmuir adsorption isotherm.

SECTION - II

Q7) Explain the following terms in detail. [16]

- Catalyst deactivation.
- Void volume and solid density of the catalyst.

OR

Q8) Write the short notes on the following. [16]

- BET method.
- Pore volume distribution.

Q9) Explain the structure of the zeolites and industrial applications in details. [16]

OR

- Q10)a)** Explain the templated molecular sieves in detail with application. [8]
b) Explain in detail 'ZSM-5'. [8]

- Q11)a)** Give the kinetics of non competitive inhibition of enzyme reaction. [9]
b) Explain the method to determine the M-M kinetics constants using the data taken in MFR. [9]

OR

- Q12)a)** Explain the enzyme and microbial fermentation in detail. [9]
b) Explain inhibition in biocatalyst. [9]

