

QP CODE: 25050794



Reg No :

Name :

MSc DEGREE (CSS) EXAMINATION, DECEMBER 2025

First Semester

M Sc Industrial Chemistry

Core Courses - CH060104 - INDUSTRIAL PROCESSES & REACTOR ANALYSIS

2020 Admission Onwards

EE18DECF

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

Answer any **eight** questions.

Weight **1** each.

1. Write the name of the three ideal reactors and explain why they are called ideal reactors.
2. What assumptions were made in the derivation of the design equation for a) batch reactor b) CSTR.
3. List out the advantages of vacuum distillation over other types of distillation processes.
4. Differentiate between tray columns and packed columns.
5. Define supersaturation. Write any two methods used to achieve supersaturation.
6. What are the advantages of Oslo crystallizers?
7. What are nitrating agents? Give two examples.
8. What is sulphonation? Illustrate with example.
9. What is meant by catalytic poisoning ?
10. How can the uniform distribution of sterile air be ensured inside the bioreactor ?

(8×1=8 weightage)

Part B (Short Essay/Problems)

Answer any **six** questions.

Weight **2** each.

11. A reactor is to be designed to have the conversion data as shown in the table given below. Also, the reactor conditions: 500 K, 8.2 atm, $FA_0 = 0.4 \text{ mol s}^{-1}$, and the initial charge was pure A.

X	0.0	0.1	0.2	0.4	0.6	0.7	0.8
$-r_A (\text{mol/m}^3\text{s})$	0.450	0.370	0.300	0.195	0.113	0.079	0.050

- a. Calculate the volume necessary to achieve 80% conversion in a CSTR reactor under these conditions
- b. How would your answers change if the flow rate, nA_0 , were reduced to 0.2 mol s^{-1} ?





12. Describe the following methods to determine the order of a reaction.
 1. Integration method
 2. Half-life method
13. Discuss the advantages and disadvantages of scraped heat exchangers.
14. Write any four applications each of
 1. Vertical evaporators
 2. Forced circulation evaporators
15. Discuss the various liquid distribution techniques used in absorption.
16. Describe Biazzini nitrator with a neat sketch.
17. Explain continuous process in sulphonation.
18. Is it possible to get pure ethyl alcohol by the microbial fermentation of molasses in a bioreactor ? Explain.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight **5** each.

19.
 - a. Write the Arrhenius equation . Explain the significance of the Arrhenius parameters.
 - b. Discuss two methods for determination of Arrhenius parameters.
 - c. The rate constant of a certain hydrolysis reaction is $2.3 \times 10^{-2} \text{ litre mol}^{-1} \text{ s}^{-1}$ at 0°C and $8.2 \times 10^{-2} \text{ litre mol}^{-1} \text{ s}^{-1}$ at 15°C . Evaluate the energy of activation and the Arrhenius pre-exponential factor.
20. Explain with neat diagrams, shell and tube heat exchangers.
21. Define crystallization. What are factors affecting crystallization? Discuss the various steps involved in crystallization.
22. Give a broad account on the design, fabrication and working of a Bioreactor.

(2×5=10 weightage)

