P P SAVANI UNIVERSITY

7th Semester of B. Tech. Examination

November 2022

SECH4050 Modelling, Simulation & CAD in Chemical Engineering

28.11.2022, Monday **Time: 10:00 a.m. To 12:30 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1	Draw a PFD symbol for each piece of equipment and write a short note on each: (i) Batch reactor (vi)Splitter (ii)Plug flow reactor (vii)Mixer (iii)Distillation column (viii)Heat exchanger (iv)Compressor (ix)Heater (v)Pump (x)Decanter	**[10]**	**CO 1**	**BTL 6**
Q - 2	What are the factors that affect a chemical reaction? Explain each in details.	**[10]**	**2**	**4**
Q - 3	Derive the performance equation for a PFR with first order kinetics.	**[10]**	**3**	**3**

SECTION – II

Q - 1	Write the names of software's available for mathematical modelling and simulation for chemical engineering applications. Discuss how they help and differ from each other in solving the problems.	**[10]**	**4**	**1**
Q - 2	The liquid phase irreversible isomerization reaction of 2-Butene follows 1st order reaction kinetics. Cis-2-butene → Trans-2-butene, $rA = kC_A$, $k = 0.23\ min^{-1}$ Determine the conversion (X) of this reaction in a CSTR and a PFR at 10 min residence time. Feed condition: 25° C, 1 atm and 1 kmol/hr feed mole flow. Assume steady state.	**[10]**	**2**	**5**
Q - 3	What is Mathematical Model? Why do we need mathematical modelling for process analysis?	**[10]**	**3**	**2**

****

CO : Course Outcome Number BTL : Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create