Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Institute of Technology
Semester-5 (B.Tech.)

Subject: DWSIM Chemical Process Simulator BETCH15318

Type of course: Multidisciplinary open professional elective courses

Prerequisite: Basic knowledge of chemical engineering principles, mass and energy balances, thermodynamics, and process modeling.

Rationale: Process simulation techniques used in chemical industries to analyze and optimize processes. It equips them with practical skills in using simulation software for process design, troubleshooting, and performance evaluation.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
0	0	4	2	00	00	10	40	50	100

Legends: CI - Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE - Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Sr. No.	Course content
1	**Basics of DWSIM software and Distillation simulation** Creating a material stream in DWSIM Introduction to Flow sheeting Shortcut Distillation Rigorous Distillation Sensitivity Analysis and Adjust
2	**Simulation of Different type of Reactor:** Plug Flow Reactor Continuous Stirred Tank Reactor Conversion Reactor Equilibrium Reactor Gibbs Reactor

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3	**Simulation of Heat Exchangers:** Heat Exchanger Shell and Tube Heat Exchanger Binary Phase Envelope Calculation of Bubble Points and Dew Points
4	**Simulation of Miscellaneous operations** Chemsep Distillation Column Absorption Column Heterogeneous Catalytic Reaction Custom Unit Operation using Scilab Custom Unit Operation using Python

Continuous Assessment:

S.N.	Active Learning Activities	Marks
1	**Simulation of Plug flow and Continuous Stirrer Tank Reactor:** Run a simulation for reaction of your choice suitable for PFR and CSTR and submit comparative data of both on GMIU web portal.	10
2	**Heat Exchanger Simulation:** Run simulation for Double pipe heat exchanger using toluene as cold stream and styrene as hot stream for different feed conditions submit result on GMIU web portal	10
3	**Simulation of Adsorption Using NRTL:** Run Simulation for adsorption for compound water, acetone, nitrogen and oxygen using NRTL. Simulate for different thermodynamics and feed conditions submit result on GMIU web portal	10
4	**Simulation of Custom Model:** Create a custom model for a flash column to separate the gas-liquid phase for a mixture of compounds, submit flow sheet and calculated result for your choice of streams and conditions, submit results on GMIU web portal	10
5	**Industrial Process Simulation:** Industrial Application of Simulation Make a simulation of an industry or process of your choice and submit results on GMIU web portal.	10
	Total	50

Suggested Specification table with Marks (Theory): 60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	NA	NA	NA	NA	NA	NA

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Understand the basic functionalities and applications of process simulation software to model chemical and mechanical processes
CO2	Apply process simulation techniques to analyze the performance of unit operations such as distillation, heat exchangers, and reactors
CO3	Evaluate the effects of different process parameters like temperature, pressure, and flow rate on system efficiency and optimization
CO4	Develop skills to simulate and troubleshoot industrial processes, including fluid flow, mass transfer, and heat transfer operations

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Book/Source

[1] https://dwsim.org/

[2] https://dwsim.org/wiki/index.php?title=Tutorials

[3] https://spoken-tutorial.org/tutorialsearch/?search_foss=DWSIM&search_language=English

[4] Chemical Engineering Process Simulation" by Dominic C. Y. Foo et al

[5] Chemical Process Technology and Simulation" by Koyikal