CHAITANYA BHARATI INSTITUTE OF TECHNOLOGY
DEPARTMENT OF CHEMICAL ENGINEERING
Stake holder involvement in Curriculum Development AY 2022-23
Action taken and implementation in Curriculum

INDEX

HEAD
Dept. of Chemical Engineering
Chaitanya Bharathi Institute of Technology
Gandipet, Hyderabad-75.

1) Students' feedback- Actions taken

S.No	Suggestions	Actions taken
1	• Introduction of Electro chemistry, Course on basics of business administration A lab session involving Bio-Chemical engineering basics, Distribution of technical seminar and project part 2 in different semesters. • To simplify the documentation process that is required for the projects/internships at external institutions. • All core subjects to be completed by 3rd Year, • Research paper writing software, e.g.: Latex should be introduced to the curriculum or can be integrated into research methodology with lab sessions.	• All core subjects are completed by VII sem in R 22, which include concepts for GATE and attending Core job interviews. • Latex can be imparted as a Value added course.
2	• Internships in each semester so that students are exposed to industrial experience. • Students should be offered research subjects and its practical applications Encouraging more students to participate in seminars/presentations so as to increase their technical skills and vocabulary	• Internships are given sufficient credits, so as to include other core subjects in curriculum • Mentoring is offered to the students to encourage them to participate in Seminars and Workshops.
3	• Electives like Python, Machine learning should also be made core to help familiarize with the current technologies also useful in chemical engineering • Core subjects should be completed early for preparation for any competitive exams and internships/projects. • Certain important subjects like Optimization of chemical processes, Computational fluid dynamics can also be mandatory • General Aptitude or QUANT/ logical reasoning should also be included in the curriculum	• Where ever possible such subjects are offered as either core or elective subjects. • Core subjects are distributed in the final year, such that the students can prepare for exams like GATE and other compitive exams. • Due to restriction on Core subjects CFD, Optimization etc., are included as elective subjects.

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Choice Based Credit System (With effect from 2025-2026)

B.Tech (Chemical Engineering)

Semester VII

S.No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			Credits
			Hours per Week			Duration of SEE in Hours	Maximum Marks		
			L	T	P/ D		CI E	SEE	
THEORY									
1	22 CHC25	Artificial Intelligence in Chemical Engineering	2	-	-	3	40	60	2
2	22 CHC26	Material Science in Chemical Engineering	3	-	-	3	40	60	3
3	22 CHC27	Transport Phenomena	3	-	-	3	40	60	3
4	22 CHEXX	Professional Elective -V	3	-	-	3	40	60	3
PRACTICAL									
6	22EGC03	Employability Skills	-	-	2	2	50	50	1
7	22CHC28	Artificial Intelligence in Chemical Engineering Lab	-	-	3	3	50	50	1.5
8	22CHC29	Plant Design Lab	-	-	3	3	50	50	1.5
9	22CHC30	Project Part I	-	-	4	-	50	-	2
TOTAL			**11**	-	**12**	-	**360**	**390**	**17**
Clock hours per week 23									

S.no	Course Code	**Professional Elective V**
1	22CHE17	Computational Fluid Dynamics
2	22CHE18	Design and Analysis of Experiments
3	22CHE19	Optimization of Chemical Processes
4	22CHE20	Process Intensification

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Choice Based Credit System (With effect from 2025-2026)

B.Tech (Chemical Engineering)

Semester VIII

S. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			Credits
			Hours per Week			Duration of SEE in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1.	22XXOYY	Open Elective III	3	-	-		40	60	3
PRACTICAL									
2	22CHC31	Technical Seminar	-	-	2		50	-	1
3	22CHC32	Project Part II	-	-	8		100	100	4
TOTAL			**03**		**10**	-	190	160	**8**

S. No	Course Code	**Open Elective III**
1	22CEO02	Disaster Risk Reduction and Management
2	22BTO04	Bioinformatics
3	22ADO02	Data Science using Python
4	22EEO07	Fundamentals of Electric Vehicles

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Details of the Credit Weightage distribution for Sem I to Sem VIII in R22 Scheme

Sem I to Sem VIII

S.No	Credits weightage distribution	Credits Proposed	Credits Offered
1	Humanities and Social Sciences including Management courses	11.5	9.5
2	Basic Science courses	21	21
3	Basic Engineering Science Courses (BESC)	22.5	22.5
4	Professional Core Courses (PCC)	48 - 64	69
5	Professional Elective Courses (PEC): Relevant to the chosen specialization/branch	12 - 18	15
6	Open Elective Courses (OEC) –Electives from other technical and /or emerging subjects	15 - 09	09
7	Project work, Seminar & internship in industry or elsewhere	14	14
8	Mandatory Courses	NC	NC
9	Total	160	160

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B.Tech (Chemical Engineering)

Semester VII

S.No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			Credits
			Hours per Week			Duration of SEE in Hours	Maximum Marks		
			L	T	P/ D		CI E	SEE	
THEORY									
1	22 CHC25	Artificial Intelligence in Chemical Engineering	2	-	-	3	40	60	2
2	22 CHC26	Material Science in Chemical Engineering	3	-	-	3	40	60	3
3	22 CHC27	Transport Phenomena	3	-	-	3	40	60	3
4	22 CHEXX	Professional Elective -V	3	-	-	3	40	60	3
PRACTICAL									
6	22EGC03	Employability Skills	-	-	2	2	50	50	1
7	22CHC28	Artificial Intelligence in Chemical Engineering Lab	-	-	3	3	50	50	1.5
8	22CHC29	Plant Design Lab	-	-	3	3	50	50	1.5
9	22CHC30	Project Part I	-	-	4	-	50	-	2
TOTAL			**11**	-	**12**	-	**360**	**390**	**17**
Clock hours per week 23									

S.no	Course Code	**Professional Elective V**
1	22CHE17	Computational Fluid Dynamics
2	22CHE18	Design and Analysis of Experiments
3	22CHE19	Optimization of Chemical Processes
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2) Teachers feedback- Actions taken

S.No	Suggestions & opinions	Actions taken
1	More up skilling courses for better employability	Ups skilling courses during winter are offered and students enrol for NPTEL courses in latest topics
2	Petrochemical Technology to be split into two courses as petroleum Refining and Production of Petrochemicals	Credits may not permit extensive study of a particular specialized course. Hence included as a single subject.
3	The Professional electives can be grouped based on the skills that required by industry/ R&D and student can choose the professional electives in that group in each semester to acquire the related skills.	From the experience students are preferring elective choices for standalone subjects, so grouping of subjects can be a difficulty.

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY

(In line with AICTE Model Curriculum with effect from AY 2023-24)

B. Tech (Chemical Engineering)

SEMESTER IV

S. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			Credits
			Hours per Week			Duration of SEE in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1	22CHC07	Chemical Engineering Thermodynamics-II	3	-	-	3	40	60	3
2	22CHC08	Chemical Technology	3	-	-	3	40	60	3
3	22CHC09	Heat Transfer	3	-	-	3	40	60	3
4	22CHC10	Instrumentation and Material Characterization	2	-	-	3	40	60	2
5	22CHC11	Mass Transfer Operations- I	3	1	-	3	40	60	4
6	22CHEXX	Professional Elective I	3	-	-	3	40	60	3
7	22EGM01	Indian Constitution and Fundamental Principles	2	-	-	2	--	50	NC
PRACTICAL									
8	22CHC12	Heat Transfer Lab	-	-	3	3	50	50	1.5
9	22CHC13	Instrumentation and Material Characterization Lab	-	-	3	3	50	50	1.5
10	22CHU01	Up-skilling Certification Course-I	-	-	60*	-	25	-	0.5
TOTAL			**19**	**01**	**06**				**21.5**
Clock Hours Per Week: 26									

Professional Elective I	
22CHE01	Energy Engineering
22CHE02	Food Processing Technology
22CHE03	Pulp and Paper Technology
22CHE04	Water Conservation and Management

Shall not be consider in regular teaching hours as it belongs to the course held during winter break.

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Choice Based Credit System (With effect from 2024-2025)

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Semester VI

S. No	Course Code	Title of the Course	Scheme of Hours per Week			Scheme of Duration of SEE In Hours	Maximum CIE	Maximum SEE	Credits
			L	T	P/D				
THEORY									
1	22CHC19	Chemical Reaction Engineering II	3	-	-	3	40	60	3
2	22CHC20	Process Dynamics & Control	3	-	-	3	40	60	3
3	22CHC21	Plant Design & Economics	3	-	-	3	40	60	3
4	22EGM03	Universal Human Values-2	1	-	-	-	50	-	1
5	22CHEXX	Professional Elective III	3	-	-	3	40	60	3
6	22CHEXX	Professional Elective IV	3	-	-	3	40	60	3
7		Open Elective - II	3	-	-	3	40	60	3
PRACTICAL									
8	22CHC22	Chemical Reaction Engineering Lab	-	-	3	3	50	50	1.5
9	22CHC23	Process Dynamics & Control Lab			3		50	50	1.5
10	22CHU02	Upskill Certification course - II	-	-	60	-	-	-	0.5
11	22CHC24	Mini Project	-	-	4	-	50	-	2
	TOTAL		**19**	-	**10+60**	-	**440**	**460**	**24.5**

S. No	Course Code	**Professional Elective III**
1	22CHE09	Fuel Cell Technology
2	22CHE10	Petrochemical Technology
3	22CHE11	Pharmaceutical Technology
4	22CHE12	Safety and Hazard Analysis

S.No	Course Code	**Professional Elective IV**
1	22CHE13	Biochemical Engineering
2	22CHE14	Corrosion Engineering
3	22CHE15	Nuclear Engineering
4	22CHE16	Nano Science and Technology

S.No	Course Code	**Open Elective II**
1	22EGO02	Gender Sensitization
2	22ITO02	Principles of Internet of Things
3	22MEO06	Principles of Entrepreneurships and Start ups
4	22EEO01	Energy Management System

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3) Employers feedback-Actions taken

S.No	Suggestions	
1	• Knowledge on Pumps to be imparted • more focus on basic concepts	• In Fluid Mechanics theory 60% of the fifth unit is dedicated to pumps. • Design and analysis of Pumps is taught on ASPEN Plus software in Plant Design Lab.
2	• Concepts on core process and plant equipment design • Energy Optimization should be emphasized	Plant Equipment design is taught as a core subject.

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22CHC02

FLUID MECHANICS

Instruction	3 L+ 1T Hours per Week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	4

Pre-requisites: Engineering Physics, Differential Equations

COURSE OBJECTIVES: This course aims to

1. Fluid flow phenomena for incompressible and compressible fluids.
2. Conservation of momentum principles to fluid flow.
3. Flow in Pipes, Channels and flow past immersed bodies.
4. Concepts of Compressible Fluids and Non Newtonian fluids
5. Fluidization phenomena and methods for transporting the fluids

COURSE OUTCOMES: After the completion of this course, the student will be able to

1. Distinguish different types of fluids, manometers
2. Apply Shell balances to illustrate fluid flow phenomena
3. Identify the concepts of incompressible flow in pipes, channels and associated frictional losses
4. Explain the concept of fluidization and flow through packed beds.
5. Choose the types of pumps for different fluids under different conditions and Identify equipment to be used to measure fluid flow.

CO –PO-PSO Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	1	2	2
CO2	3	3	2	1	-	-	-	-	-	-	-	1	2	2
CO3	3	3	2	2	1	-	-	-	-	-	-	1	2	2
CO4	3	3	2	1	-	-	-	-	-	-	-	1	2	2
CO5	3	3	2	1	-	-	-	-	-	-	-	1	2	2

UNIT – I

Fluid Flow Phenomena and Fluid Statics: Definition of fluid, shear rate and shear stress, Newtonian and Non-Newtonian fluids, Time dependent flow, viscosity and momentum flux, compressible, incompressible, real and ideal fluids, viscosities of gases and liquids, Laminar and Turbulent flows, Reynolds experiment, Boundary layers, Hydrostatic equilibrium, U-tube manometer, inclined manometer and two fluid manometer and inverted manometer.

UNIT - II

Basic Equations of Fluid Flow: path lines, streamlines and stream tube, mass balance–equation of continuity, one dimensional flow, mass velocity, differential momentum balance-equations of motion, Couette flow, macroscopic momentum balances, momentum of stream and momentum correction factor, layer flow with free surface. Mechanical energy equation-Bernoulli equation- corrections for effects of solid boundaries, kinetic energy correction factor, corrections for fluid friction, pump work in Bernoulli equation.

UNIT-III

Incompressible Flow in Pipes and Channels and Frictional Losses: Shear stresses and skin friction, fanning friction factor, flow in noncircular channels, laminar flow of Newtonian and Non-Newtonian fluids, velocity distribution, Hagen - Poiseuille equation, Turbulent flow, universal velocity distribution, Roughness, Moody"s friction factor chart. Pipes and valves, fittings. Friction losses due to sudden expansion and contraction, Effects of fittings and valves, form frictional losses in the Bernoulli Equation. Dimensional analysis and Buckingham π –theorem and Rayleigh theorem its applications and limitations.

UNIT–IV

Flow past immersed bodies and Fluidization, Potential flow, vorticity. Differential analysis: mass and momentum balances, Navier-Stokes equation, Unidirectional flow, Viscous flow, Stokes law, Skin drag and pressure drag and drag coefficient, Flow through packed beds of solids – Kozeny Carman equation, Burke-Plummer equation and Ergun equation. Boundary layer theory, Boundary layer separation, Drag and lift force on immersed body

UNIT–V

Transportation and Metering of Fluids: Centrifugal and Positive Displacement Pumps, Characteristics of pumps, selection and design of pumps, suction lift and cavitation, NPSH, Flow meters- Venturimeter, orifice meter, Pitot tube, Rotameter, Notches and Weirs, Compressors and blowers.

TEXTBOOKS:

1. W. L. McCabe, J. C. Smith and P. Harriott, Unit Operations of Chemical Engineering, 7th Ed., Tata-McGraw Hill Chemical Engineering Series, New Delhi, 2005.
2. C.J. Geankopolis, —Transport processes and unit operationsl, 3rd Ed., Prentice Hall Publishers, USA, 1993.

SUGGESTED READINGS:

1. James O. Wilkes, —Fluid Mechanics for Chemical Engineers with Micro fluids and CFDl, 2nd Ed., University of Michigan, Prentice Hall Intl., 2006.
2. Kurmi, R.S., —Hydraulics, Fluid Mechanics and Hydraulic Machinesl, 20th Ed., S. Chand and Company Pvt. Ltd., New Delhi, 2014.

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22CHC29 **PLANT DESIGN LAB**

Instruction	3P Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Pre-requisites: MEBC, Thermodynamics, FM, CRE, MTO

Course Objectives: This course will

1. Provide students the opportunity to acquire simulation skills in Chemical Plant equipment design.
2. Introduce students to the importance and principles of design of a plant
3. Provide an overall view of design concepts of various unit operations and processes.
4. Demonstrate the overview of plant layout, and flow sheeting and perform economic evaluation and sensitivity analysis of the plant
5. Help students develop simulation skills using various chemical Engineering software like Aspen Plus,Aspen Hysys software, DWSIM, MATLAB etc.

Course Outcomes: At the end of the course, the student will be able to:

1. Understand and apply the design concepts to various unit operations and processes.
2. Design various Heat and mass transfer equipment.
3. Design pumps, pressure vessels and reactors.
4. Analyze the performance of a process plant using economic evaluation and sensitivity analysis.
5. Perform simulation of design case studies in Aspen Plus/Aspen Hysys/DWSIM software.

CO-PO-PSO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO11	PSO12
CO1	3	2	2	2	2	-	-	-	2	-	-	2	3	2
CO2	3	2	2	2	2	-	-	-	2	-	-	2	3	2
CO3	3	2	2	2	2	-	-	-	2	-	-	2	3	2
CO4	3	2	2	2	2	-	-	-	2	-	-	2	3	2
CO5	3	2	2	2	2	-	-	-	2	-	-	2	3	2

LIST OF EXERCISES (A minimum of 10 experiments in the list are to be performed)

1. Symbols for Piping and Instrumentation, Flow sheet symbols for unit operations.
2. Design and analysis of pumps and pressure vessels.
3. Design of Heat Transfer Equipment - Shell and Tube Heat Exchanger
4. Design of Heat Transfer Equipment - Condensers/Evaporators
5. Design of Reactors - 1
6. Design of Reactors - 2
7. Design of Mass Transfer Equipment - 1
8. Design of Mass Transfer Equipment - 2
9. Economic Evaluation Analysis in Aspen Plus - Case Study 1
10. Economic Evaluation Analysis in Aspen Plus - Case Study 2
11. Performing Sensitivity Analysis in Aspen Plus - Case Study 1
12. Performing Sensitivity Analysis in Aspen Plus - Case Study 2
13. Overall Plant Layout and Design - Case Study

Text Books

1. Joshi, M.V. —Process Equipment Designl, 2nd Ed., McMillan Co. of India Limited, Madras, 1976.
2. Bachurst, J.R. and Harker, J.A. —Process Plant Designl, Heiman Education Books, London, 1973.
3. Peters. M.S. and Timmerhaus, K.D., —Plant Design and Economics for Chemical Engineeringl, 4th Edition, McGraw Hill, Singapore, 1991
4. Chemical Process Design and Simulation: Aspen Plus and Aspen Hysys Applications, Juma Haydary,AICHE, Wiley Pub.

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22CH C 21 **PLANT DESIGN AND ECONOMICS**

Instruction	3Hours per week
Duration of SEE	3 Hours
SEE	60Marks
CIE	40Marks
Credits	3

Prerequisites: MEBC, FM, HT

Course objectives: This course helps the students to:

1. Basics of plant design and plant layout
2. Criteria of selecting process equipment, based on which optimized design can be identified
3. Importance of process economics in process industries

Course Outcomes: At the end of the course students will be able to

1. Understand the basic aspects of plant design and its elements
2. Select a suitable optimized cost-effective equipment for a given process
3. Learn the basics of cost accounting and perform the cost analysis of a plant.
4. Identify methods of estimation of depreciation and profitability studies.
5. Design & Optimize the cost-effective process equipment and plants

CO-PO-PSO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	2	-	2	1	2	3
CO2	3	1	1	-	-	-	-	-	2	-	1	1	2	3
CO3	3	2	2	-	-	-	-	-	2	-	1	1	3	3
CO4	3	2	2	-	-	-	-	-	2	-	1	1	3	3
CO5	3	2	2	-	-	-	-	-	2	-	1	1	3	3

UNIT - I

Basic Aspects of Process Design: Introduction – definitions of plant design, process synthesis, process simulation; design factors, design problem and steps; Process flow diagram and Block flow diagram; Mass and energy balances; Piping and Instrumentation diagram; Equipment Design Codes and standards.

UNIT - II

Selection of Process Equipment, Specification and Design; Process Utilities, Utility flow diagram with Examples; Materials choice; Plant location – general site considerations, Site layout and Plant layout, Ethics in Engineering design. Safety factors.

UNIT - III

Process Economics –Cost Accounting – Capital investment, cost index, Equipment cost; Elements of cost; Expenses; Project cost and cost of production, Various components of cost of production and their estimation, Various components of project cost, variable cost, fixed cost, breakeven point and their estimation. Estimation of Working Capital. Balance sheets, Project financing, concept of interest, (Present Worth, Future Worth) time value of money, Margin of Safety

UNIT – IV

Depreciation – Types, Methods of determining Depreciation Profitability Analysis of Projects, Alternatives Investment, Replacements, Payout time and Rate of return, Total annualized cost, cost indices, payback period, discounted cash flow; Sensitivity analysis, Inflation

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4) Alumni feedback- Actions taken

S.No	Suggestions	Actions taken
1	• Instrumentation and Material Characterization in 3rd semester and Fluid Mechanics in the 4th semester. Same goes with labs. • Process Modeling and Simulation can be shifted to VII Semester. • Design and Analysis of Experiments and Process Intensification are two core areas if the student chooses to pursue his career in the Pharma field. It would be great if the electives are divided into two different semesters rather than under one elective option. • Biochemical Engineering could be introduced as a major subject as many prominent organizations are working in the field providing lots of opportunities. • Elective of Energy Engineering to be offered after Heat Transfer. • Fuel cell can be swapped with PI or DAE	Biochemical Engg is taught as Core elective due to restriction on number of Core courses.
2	• No industrial exposure except plant design to an extent that gives some idea. • Elective on Oil and gas industry along with refineries would help students who would like to pursue their careers in core engg. • Understanding of the basics of sustainability. Hands on experience on simulation softwares.	• To offer industrial exposure all students have to undertake internships which have credits • ASPEN Plus and MATLAB simulation softwares are used in Process Modelling and simulation and Plant Design Labs.
3	Courses with Content related to can be introduced • Data modelling and Data Analytics with Python in Chemical Engineering, Machine learning and cloud computing can be introduced. • Application developments • Cross skilling • Customer facing skills • End to end data flow	• Deep Learning and Data Science Using Python are introduced as part of open electives. • AI in Chemical Engg is introduced as core course. HEAD Dept. of Chemical Engineering Chaitanya Bharathi Institute of Technology Gandipet, Hyderabad-75.

22CH E-13 **BIOCHEMICAL ENGINEERING**
(Professional Elective IV)

Instruction	3L Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Prerequisites: Basics of biology, Mass Transfer, CRE

Course Objectives: This course helps the students to

1. Understand the functions of living cells and apply the principles of Chemical Engineering to bioprocesses.
2. Conduct analysis on the biological factors that are important in the design, operation, performance and/or monitoring of a biological process.
3. Understand the significance of microbes and enzymes.
4. Understand the applications of different bioprocesses.

Course Outcomes: On successful completion of this module, students should be able to

1. Describe the basic structure and function of cells & relate cell function to products and processes useful to man
2. Explain classification, growth concepts and various types of interactions in microbes.
3. Illustrate the significance of enzymes as biocatalysts and immobilized enzymes.
4. Identify and explain the basic features of bioreactors, separation process and down stream processes
5. Summarize the principles of Fermentation technology and products from Industrial biotechnology

CO-PO-PSO Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	-	-	-	-	1	1
CO2	2	-	1	-	1	-	-	1	1	-	-	2	2	2
CO3	2	2	2	1	1	1	1	1	1	-	-	2	2	2
CO4	2	2	2	1	1	1	1	-	1	-	-	1	2	2
CO5	1	-	1	-	-	1	-	-	-	-	-	1	1	1

UNIT – I

Introduction to Biochemical Engineering, Molecular Biology& Bio Chemistry

Biochemical Engineering Principles, Biophysics and cell doctrine: Atomic Theory and Cell Theory, Important cell types, structure and functions of a typical cell and their components, Transport across cell membranes: Passive and facilitated diffusion, Active transport Structure and functions of Bio Molecules: Carbohydrates, lipids, Nucleotides to Nucleic Acids – RNA and DNA, Amino acids to Proteins - the building blocks of biochemical life Biosynthesis and Metabolic Pathways: Biosynthesis of Small and Macro Molecules Introduction of metabolic pathways and end products of glucose metabolism.

UNIT – II

Introductory Microbiology

Introduction to Microbiology: Classification and Industrial uses of Microorganisms Growth and Reproduction of Microbes: Growth cycle phases for batch cultivation. Monod's growth kinetics – Growth

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22CHC29 **PLANT DESIGN LAB**

Instruction	3P Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Pre-requisites: MEBC, Thermodynamics, FM, CRE, MTO

Course Objectives: This course will

1. Provide students the opportunity to acquire simulation skills in Chemical Plant equipment design.
2. Introduce students to the importance and principles of design of a plant
3. Provide an overall view of design concepts of various unit operations and processes.
4. Demonstrate the overview of plant layout, and flow sheeting and perform economic evaluation and sensitivity analysis of the plant
5. Help students develop simulation skills using various chemical Engineering software like Aspen Plus,Aspen Hysys software, DWSIM, MATLAB etc.

Course Outcomes: At the end of the course, the student will be able to:

1. Understand and apply the design concepts to various unit operations and processes.
2. Design various Heat and mass transfer equipment.
3. Design pumps, pressure vessels and reactors.
4. Analyze the performance of a process plant using economic evaluation and sensitivity analysis.
5. Perform simulation of design case studies in Aspen Plus/Aspen Hysys/DWSIM software.

CO-PO-PSO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO11	PSO12
CO1	3	2	2	2	2	-	-	-	2	-	-	2	3	2
CO2	3	2	2	2	2	-	-	-	2	-	-	2	3	2
CO3	3	2	2	2	2	-	-	-	2	-	-	2	3	2
CO4	3	2	2	2	2	-	-	-	2	-	-	2	3	2
CO5	3	2	2	2	2	-	-	-	2	-	-	2	3	2

LIST OF EXERCISES (A minimum of 10 experiments in the list are to be performed)

1. Symbols for Piping and Instrumentation, Flow sheet symbols for unit operations.
2. Design and analysis of pumps and pressure vessels.
3. Design of Heat Transfer Equipment - Shell and Tube Heat Exchanger
4. Design of Heat Transfer Equipment - Condensers/Evaporators
5. Design of Reactors - 1
6. Design of Reactors - 2
7. Design of Mass Transfer Equipment - 1
8. Design of Mass Transfer Equipment - 2
9. Economic Evaluation Analysis in Aspen Plus - Case Study 1
10. Economic Evaluation Analysis in Aspen Plus - Case Study 2
11. Performing Sensitivity Analysis in Aspen Plus - Case Study 1
12. Performing Sensitivity Analysis in Aspen Plus - Case Study 2
13. Overall Plant Layout and Design - Case Study

Text Books

1. Joshi, M.V. —Process Equipment Designl, 2nd Ed., McMillan Co. of India Limited, Madras, 1976.
2. Bachurst, J.R. and Harker, J.A. —Process Plant Designl, Heiman Education Books, London, 1973.
3. Peters. M.S. and Timmerhaus, K.D., —Plant Design and Economics for Chemical Engineeringl, 4th Edition, McGraw Hill, Singapore, 1991
4. Chemical Process Design and Simulation: Aspen Plus and Aspen Hysys Applications,

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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Choice Based Credit System (With effect from 2025-2026)

B.Tech (Chemical Engineering)

Semester VIII

S. No	Course Code	Title of the Course	Scheme of Instruction			Scheme of Examination			Credits
			Hours per Week			Duration of SEE in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1.	22XXOYY	Open Elective III	3	-	-		40	60	3
PRACTICAL									
2	22CHC31	Technical Seminar	-	-	2		50	-	1
3	22CHC32	Project Part II	-	-	8		100	100	4
TOTAL			**03**		**10**	-	190	160	**8**

S. No	Course Code	**Open Elective III**
1	22CEO02	Disaster Risk Reduction and Management
2	22BTO04	Bioinformatics
3	22ADO02	Data Science using Python
4	22EEO07	Fundamentals of Electric Vehicles

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