CHAITANYA BHARATI INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CHEMICAL ENGINEERING
Stake holder involvement in Curriculum Development
AY 2018-19

Action taken and implementation in Curriculum

INDEX

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Gandipet, Hyderabad-75.

1) Students

S.no.	Suggestions & opinion	Actions Taken
1	Courses like Pharmaceutical Technology and allied subjects can be introduced as core or elective courses	Pharmaceutical Technology is introduced as elective in curriculum per the suggestions in R 16 scheme.
2	Food Technology / Textile technology courses can be introduced.	Food Technology is included in the syllabus in R 16 as per the suggestions
3	Courses on Patents, Law , Psychology can be given a thought to be included in curriculum for overall development.	IPR is introduced as open elective as per the suggestions

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Students Proofs

16CH E 10

PHARMACEUTICAL TECHNOLOGY
(ELECTIVE IV)

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	3

Course Objectives: The students will able to understand

1. Grade of chemicals, Principles & Various Tests.
2. Preparation & testing of Pharmaceuticals & final chemicals.
3. The Concepts & Principles to draw the flow sheets.
4. Methods & equipment used for Tablets, Capsules Preparation
5. Sterilization methods.

Course Outcomes: At the end of the Course Students will able to

1. Get a know how about the grades, Identify the Impurities & limit tests.
2. Prepare & test the Properties of Pharmaceuticals & fine Chemicals.
3. Draw flow sheets for Manufacturing Pharmaceuticals.
4. Draw flow sheets for Manufacturing Chemicals.
5. Have a theoretical knowledge about tablet & Capsule making.
6. Know various sterilization methods.

UNIT I

Introduction : A brief outline of grades of chemicals, sources of impurities in chemicals, principles (without going into details of individual chemicals) of limit test for arsenic, lead, iron, chloride and sulfate in Pharmaceuticals.

UNIT II

Outlines of Preparation, properties, uses and testing of the following Pharmaceuticals

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16CH E 16

FOOD TECHNOLOGY
(CORE ELECTIVE VI)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course objectives: This course helps the students to understand the

1. Basic food preparation techniques. Food quality.
2. Physical, chemical, and/or microbiological changes in food and mechanical manipulation.
3. Learn fundamentals of modifying food to meet current nutrition recommendations
4. Learn to find credible sources of information re. food science and nutrition.
5. Food processing Applications and Packaging

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

1. Explain techniques in food processing
2. Design process equipment to achieve the desired quality of food.
3. Develop novel food processes that have a minimal effect on food quality
4. Select control strategies to maintain food quality
5. Apply the scientific method to food science problems

UNIT – I

Introduction: General aspects of food industry, World food demand and Indian scenario, Constituents of food, Quality and nutritive aspects, Product and Process development, engineering challenges in the Food Processing Industry.

UNIT – II

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16ME O 04

INTELLECTUAL PROPERTY RIGHTS
(OPEN ELECTIVE I)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives: This course will help the students to understand the

1. Fundamental aspects of IP
2. Aspects of IPR acts.
3. Awareness of multi disciplinary audience
4. Awareness for innovation and its importance
5. The changes in IPR culture and techno-business aspects of IPR

Course outcomes: At the completion of this course, students will be able to

1. Will respect intellectual property of others
2. Learn the art of understanding IPR
3. Develop the capability of searching the stage of innovations.
4. Will be capable of filing a patent document independently.
5. Completely understand the techno-legal business angle of IPR and converting creativity into IPR and effectively protect it.

UNIT-I

Overview of Intellectual Property: Introduction and the need for intellectual property right (IPR), IPR in India – Genesis and Development, IPR abroad, Some important examples of IPR. Importance of WTO, TRIPS agreement, International Conventions and PCT

Patents: Macro economic impact of the patent system, Patent and kind of inventions protected by a patent, Patent document, How to protect your inventions. Granting of patent, Rights of a patent, how extensive is patent protection. Why protect inventions by patents. Searching a patent, Drafting of a patent, Filing of a patent, the different layers of the international patent system, (national, regional and international options), compulsory licensing and licensers of right & revocation, Utility models, Differences between a utility model and a patent. Trade secrets and know-how agreements

UNIT-II

Industrial Designs: What is an industrial design. How can industrial designs be protected? What kind of protection is provided by industrial designs? How long does the protection last? Why protect industrial designs?

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Faculty

S.no	Suggestions & opinion	Action Taken
1	MATLAB can be used for coding in Process Modeling simulation lab	Suggestion implemented in the curriculum instead of C Programming
2	Electives on Green Technology/ Sustainable Engineering and Catalysis can be introduced as part of curriculum	These are introduced in curriculum later
3	Courses on AI and ML, Data Science for Chemical Engineers can be introduced for employment purpose	Consideration was made and implemented

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Faculty Proofs

16CH C 20

PROCESS MODELING SIMULATION AND OPTIMIZATION

Instruction	4 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	70 Marks
CIE	30 Marks
Credits	4

Course Objectives: This course helps the students to understand the:

1. Fundamental laws of mass and of energy.
2. Uses and types of mathematical models.
3. formulate linear and non-linear process models.
4. formulate ODE process models and curve-fitting.
5. significance of optimization principles.
6. open-loop simulation and design of chemical processes.

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

1. formulate a process model by applying fundamental laws of mass and energy balance.
2. formulate linear and non-linear process models for chemical processes and apply numerical methods and MATLAB codes to solve them.
3. formulate ODE process models and solve by numerical methods and MATLAB coding.
4. fit polynomial functions as process models and solve by regression analysis and MATLAB coding.
5. optimize using different elimination methods of non-linear programming.
6. design and simulate chemical processes.

Note: Use of "MATLAB" programming techniques for problem solving.

UNIT – I: Formulation of process models

Definition of mathematical modeling, process models, types and uses, principles of formulation. Fundamental laws of mass and energy. Application of laws and process models to develop – Total continuity equation, component continuity equations, energy equation, momentum equation.

UNIT – III: Numerical solutions of linear and non-linear process models

Formulation of linear simultaneous process models and solutions by direct methods

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Model Curriculum (with effect from 2019-20)

B.TECH (Chemical Engineering)

SEMESTER – V

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	18CH C10	Chemical Reaction Engineering I	3	-	-	3	30	70	3
2	18CH C11	Mass Transfer I	3	-	-	3	30	70	3
3	18CH C12	Heat Transfer	3	1	-	3	30	70	4
4	18CH C13	Particle and Fluid Particle Processing	3	-	-	3	30	70	3
5		Core Elective I	3	-	-	3	30	70	3
6		Core Elective II	3	-	-	3	30	70	3
	PRACTICALS								
7	18CH C14	Chemical Engineering Lab IA- MUO	-	-	3	3	15	35	1
8	18CHC15	Chemical Engineering Lab IB- FM and HT	-	-	3	3	15	35	1
Total			**18**	**01**	**06**	-	**210**	**490**	**21**

L:Lecture T:Tutorial D:Drawing P: Practical

CIE – Continuous Internal Evaluation SEE- Semester End Examination

Core Elective I		Core Elective II	
18CH E 01	Water Conservation and Management	18CH E 04	Polymer Science and Technology
18CH E 02	Renewal Energy	18CH E 05	Green Technology
18CH E 03	Experimental and Analytical Techniques	18CH E 06	Catalysis

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B.TECH (Chemical Engineering)

SEMESTER – VI

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	18CH C 16	Chemical Reaction Engineering II	3	-	-	3	30	70	3
2	18CH C 17	Mass Transfer II	3	-	-	3	30	70	3
3	18CH C 18	Process Control	3	-	-	3	30	70	3
4		Core Elective III	3	-	-	3	30	70	3
5		Core Elective IV	3	-	-	3	30	70	3
6		Open Elective I	3	-	-	3	30	70	3
	PRACTICALS								
7	18CH C 19	Chemical Engineering Lab IIA-CRE	-	-	3	3	15	35	1
8	18CH C 20	Chemical Engineering Lab IIB-MTO and TD	-	-	3	3	15	35	1
Total			**18**	**-**	**06**	**-**	**210**	**490**	**20**

L: Lecture **T: Tutorial** **D: Drawing** **P: Practical**

CIE - Continuous Internal Evaluation **SEE - Semester End Examination**

Core Elective III		Core Elective IV	
18CH E 07	Fluidization Engineering	18CH E 10	Sugar Technology
18CH E 08	Petrochemical Technology	18CH E 11	Pulp and Paper Technology
18CH E 09	Biochemical Engineering	18CH E 12	Food Technology

Open Elective I			
18EE O 05	Waste Management	18ME O 06	Nanomaterials and Technology
18ME O 04	Entrepreneurship	18ME O 07	Intellectual Property Rights
18CS O 09	Basics Of Artificial Intelligence		

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Employers

S.no.	Suggestions & opinion	Action taken
1	Subject on fluid particle operations is needed	Suggestion implemented in R 18
2	Advanced Organic Chemistry type of courses can be introduced to have a good knowledge in Pharma industries	Subjects already included in the curriculum
3	Pharma related courses are required	Advanced Organic Chemistry and Pharmaceutical Technology and fluid particle operations are introduced

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Employers Proofs

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B.TECH (Chemical Engineering)

SEMESTER – V

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	18CH C10	Chemical Reaction Engineering I	3	-	-	3	30	70	3
2	18CH C11	Mass Transfer I	3	-	-	3	30	70	3
3	18CH C12	Heat Transfer	3	1	-	3	30	70	4
4	18CH C13	Particle and Fluid Particle Processing	3	-	-	3	30	70	3
5		Core Elective I	3	-	-	3	30	70	3
6		Core Elective II	3	-	-	3	30	70	3
	PRACTICALS								
7	18CH C14	Chemical Engineering Lab IA- MUO	-	-	3	3	15	35	1
8	18CHC15	Chemical Engineering Lab IB- FM and HT	-	-	3	3	15	35	1
Total			**18**	**01**	**06**	**-**	**210**	**490**	**21**

L:Lecture T:Tutorial D:Drawing P: Practical

CIE – Continuous Internal Evaluation SEE- Semester End Examination

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16CY E01

ADVANCED ORGANIC CHEMISTRY

Instruction	3 Hours per week
Duration of End Examination	3 Hours
Semester End Examination	70 Marks
Continuous Internal Evaluation	30 Marks
Credits	3

Course Objectives: This course helps the student to

1. impart knowledge of organic chemistry to chemical engineering students.
2. learn nomenclature and isomerism of organic molecules in a better way which forms the basis of our life.
3. gain knowledge in designing new synthetic processes.
4. learn various separation techniques useful for research purpose.
5. learn the latest techniques of instrumental analysis.

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

1. identify organic functional groups using chemical processes.
2. classify the types of isomerism in various organic molecules.
3. illustrate the mechanism of a reaction using oxidizing and reducing agents.
4. design separation techniques commonly used in research industries.
5. analyze the molecules using data from spectroscopic techniques.

UNIT I:

Nomenclature and functional groups

Review of nomenclature of organic compounds, IUPAC system, Chemical

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Alumni

S. no	Suggestions/Feedback	Action Plan
1	Numerical methods theory and lab course can be introduced to solve chemical engineering Problems from Reaction Engg, Mass Transfer	Introduced theory and lab in NMCE and PMS lab with the related exercises
2	Green Technology, Waste Management courses can be offered	Green Technology is introduced as elective based on the suggestions
3	Courses on Fuel Cells can be introduced	Implemented in Renewable energy course

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Alumni (Proof)

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)
Model Curriculum (with effect from 2019-20)
B. TECH (Chemical Engineering)

SEMESTER–III

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	18MTC05	Mathematics-III	3	1	-	3	30	70	4
2	18CHC01	Technology of Surface Coatings and Oils	3	1	-	3	30	70	4
3	18CHC02	Chemical Engineering Thermodynamics-I	3	1	-	3	30	70	4
4	18CHC03	Numerical methods in Chemical Engineering	3	1	-	3	30	70	4
5	18CHC04	Material and Energy Balance computations	3	1	-	3	30	70	4
6	18EGM01	Indian constitution	2	-	-	2	-	50	Non credit
7	18EEM01	Indian traditional knowledge	2	-	-	2	-	50	Non credit
PRACTICALS									
8	18CHC05	Numerical methods in Chemical Engineering Lab	-	-	2	2	15	35	1
9	18CHC06	Technology of Surface Coatings and Oils Lab	-	-	2	2	15	35	1
Total			**19**	**05**	**4**	-	**180**	**520**	**22**

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE - Semester End Examination

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18CH C 25 **PROCESS MODELING AND SIMULATION LAB**

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	50 Marks
CIE	25 Marks
Credits	1.5

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

1. **Develop** chemical engineering process models based on fundamental laws of mass and energy transfer
2. Dynamically simulate and **interpret** two heated tanks, using MATLAB
3. Dynamically simulate and **analyze** continuous reactors in Series using MATLAB
4. **Adapt** ASPEN software to perform steady state simulation of valves
5. **Apply** ASPEN software for simulation of batch Distillation
6. **Utilize** ASPEN software to design Plug flow reactor

List of Experiments

Part I

1. Introduction to Software Packages. Understanding the basic concepts and steps involved for developing process flow sheet.

Part II

i. Setting up models for simulation

Part III: Dynamic simulation using MATLAB

1. Two-heated Tanks in series
2. Three CSTRs in series at isothermal, constant holdup condition
3. Batch Reactor
4. Vapor Liquid Equilibrium
5. Ideal Binary distillation
6. Gas-Phase Pressurized CSTR

Part IV: Steady State simulation using ASPEN

1. Simulation of reactor systems
2. Simulation of simple units like valves, pumps, flash columns, Heat exchangers
3. Simulation of Distillation columns
4. Flow-sheeting of chemical process.

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B.TECH (Chemical Engineering)

SEMESTER – V

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	18CH C10	Chemical Reaction Engineering I	3	-	-	3	30	70	3
2	18CH C11	Mass Transfer I	3	-	-	3	30	70	3
3	18CH C12	Heat Transfer	3	1	-	3	30	70	4
4	18CH C13	Particle and Fluid Particle Processing	3	-	-	3	30	70	3
5		Core Elective I	3	-	-	3	30	70	3
6		Core Elective II	3	-	-	3	30	70	3
	PRACTICALS								
7	18CH C14	Chemical Engineering Lab IA- MUO	-	-	3	3	15	35	1
8	18CHC15	Chemical Engineering Lab IB- FM and HT	-	-	3	3	15	35	1
Total			**18**	**01**	**06**	-	**210**	**490**	**21**

L:Lecture T:Tutorial D:Drawing P: Practical

CIE – Continuous Internal Evaluation SEE- Semester End Examination

Core Elective I		Core Elective II	
18CH E 01	Water Conservation and Management	18CH E 04	Polymer Science and Technology
18CH E 02	Renewal Energy	18CH E 05	Green Technology
18CH E 03	Experimental and Analytical Techniques	18CH E 06	Catalysis

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18CH E 02 **RENEWABLE ENERGY**
(Core Elective I)

Instruction	3Hours per week
Duration of SEE	3 Hours
SEE	70Marks
CIE	30Marks
Credits	3

Course Objectives: This course will help the students to understand

1. Concept of various forms of Renewable energy resources and Non-Renewable energy resources.
2. Outline division aspects and utilization of renewable energy sources for both domestics and industrial applications.
3. Identify Wind energy as alternate form of energy and to know how it can be tapped.
4. Concepts of thermo and bio-chemical process along with novel technologies to conversion of biomass to Bio fuel.
5. Environmental and cost economics of using renewable energy sources.

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

1. Describe the environmental aspects of non-conventional energy resources compared with various conventional energy systems, their prospects and limitations.
2. Explain the use of solar energy and the various components used in the energy production with respect to applications.
3. Find out the need of Wind Energy and the various components used in energy generation and know the classifications.
4. Understand the concept of Biomass energy resources and their classification, types of biogas Plants-applications
5. Summarize the knowledge of Ocean energy, tidal energy, Geothermal energy.
6. Understand the Fuel cells principles and applications.

UNIT- I
Introduction: Renewable and Non Renewable Energy Resources, World energy status, Current energy scenario in India, Environmental aspects of energy utilization, Energy and sustainable development.

UNIT- II
Solar energy basic concepts, Flat plate and Concentrating collectors, Solar Thermal Applications-Heating, Cooling, Desalination, Drying, Cooking etc. Solar pumping, Solar photo voltaic conversion, Solar cells.

UNIT- III
Wind energy availability, Wind power plants, Wind energy conversion systems, Site characteristics, Types of wind turbines.

UNIT- IV
Energy from biomass, Biomass resources, Biomass conversion technologies - Direction combustion, Pyrolysis, Gasification, Anaerobic digestion, Biogas Plants, Bioethanol and Biodiesel production

UNIT- V
Other Renewable Sources –Ocean Energy Resources, Principle of OTEC, Tidal energy, Geothermal energy, Hydroelectric Power. Fuel cell –Principle of working -Various types -Construction and applications

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