THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
Department of Chemical Engineering
BE (Chemical Engineering: 2020-21)

CO Attainment

COURSE No.	COURSE NAME		COs STATEMENT	Attainment Level
UCH301	Material and Energy Balances	UCH301.1	perform material balance for problems without chemical reactions.	2
		UCH301.2	perform material balance for problems involving chemical reactions.	3
		UCH301.3	perform energy balance for problems without chemical reactions.	2
		UCH301.4	perform energy balance for problems involving chemical reactions.	2
UCH302	Process Fluid Mechanics	UCH302.1	capability to analyze and solve problems of fluid based engineering systems including pressures and forces on submerged surfaces	3
		UCH302.2	analyze fluid flow problems with the application of the mass, momentum and energy equations	3
		UCH302.3	evaluate practical problems associated with pipe flow systems	3
		UCH302.4	analyze and solve the problems related to compressible fluids, and fluid machinery.	3
UCH305	Chemical Engineering Thermodynamics-I	UCH305.1	Estimate properties of pure substance using steam tables, property diagrams and equation of states.	3
		UCH305.2	Analyze and solve problems involving closed system and open systems for both steady state and transient processes.	3
		UCH305.3	Analyze the second law of thermodynamics for various systems and to evaluate the performance of heat engines, refrigerators and heat pumps.	3

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
Department of Chemical Engineering
BE (Chemical Engineering: 2020-21)

CO Attainment

COURSE No.	COURSE NAME		COs STATEMENT	Attainment Level
		UCH305.4	Analyze the performance of various power cycles and to identify methods for improving thermodynamic performance.	2
		UCH305.5	Analyze and solve problems involving non-reacting gas mixtures	2
UCH408	Chemical Engineering Thermodynamics-II	UCH408.1	apply fundamental concepts of thermodynamics to engineering applications.	3
		UCH408.2	estimate thermodynamic properties of substances in gas and liquid states.	3
		UCH408.3	estimate thermodynamic parameters for solutions, vapor-liquid equilibria and chemical reaction equilibria.	3
		UCH408.4	determine efficiency/coefficient of performance of thermodynamic cycles.	3
UCH402	HEAT TRANSFER	UCH402.1	solve conduction, convection and radiation problems	3
		UCH402.2	design and analyse the performance of heat exchangers	3
		UCH402.3	design and analyse the performance of evaporators & condensers	3
UCH502	Mass Transfer-I	UCH502.1	solve problems related to diffusion and interphase mass transfer and mass transfer equipments	**2**
		UCH502.2	perform design calculation related to absorption and humidification.	**3**
		UCH502.3	solve problems related to drying and crystallization	**3**
		UCH502.4	Design different types of pressure vessels	3
		UCH501.1	develop rate laws for homogeneous reactions.	3

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
Department of Chemical Engineering
BE (Chemical Engineering: 2020-21)

CO Attainment

COURSE No.	COURSE NAME		COs STATEMENT	Attainment Level
UCH501	Chemical Reaction Engineering-I	UCH501.2	analyze batch reactor data by integral and differential methods.	2
		UCH501.3	design ideal reactors for homogeneous single and multiple reactions.	3
		UCH501.4	select the appropriate type reactor/scheme.	3
		UCH501.5	demonstrate the temperature effect on reaction rate and design non-isothermal reactors..	2
UCH503	Industrial Pollution Abatement	UCH503.1	quantify and analyze the pollution load.	3
		UCH503.2	analyze/design of suitable treatment for wastewater	3
		UCH503.3	model the atmospheric dispersion of air pollutants.	3
		UCH503.4	Selection and design of air pollution control devices.	3
		UCH503.5	analyze the characteristics of solid waste and its handling & management.	3
UCH506	Process Instrumentation and Control	UCH506.1	set up a model, analyse and solve the first and second order system for its dynamic behaviour	**3**
		UCH506.2	evaluate the process stability in Laplace domain	**3**
		UCH506.3	design control system using frequency response analysis	**3**
		UCH506.4	identify advanced control techniques for chemical process.	3
		UCH405.1	analyze the energy scenario of the world.	3
		UCH405.2	carry out a comparative analysis of different types of coal, including their treatment, liquefaction and gasification.	2

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
Department of Chemical Engineering
BE (Chemical Engineering: 2020-21)

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COURSE No.	COURSE NAME		COs STATEMENT	Attainment Level
UCH405	Energy Resources	UCH405.3	compare the liquid and gaseous fuels sourced from petroleum including their characterization.	2
		UCH405.4	analyze the potential of alternate energy sources and their scope and limitations.	2
		UCH405.5	solve energy related problems related to combustion and non-combustion.	2
UCH601	Chemical Reaction Engineering-II	UCH601.1	predict the conversion in a non-ideal reactor using tracer information.	**3**
		UCH601.2	design reactors for fluid-solid reactions.	**3**
		UCH601.3	design reactors for catalytic reactions.	**3**
		UCH601.4	design towers for gas–liquid reactions with and without mass transfer considerations.	3
UCH602	Mass Transfer-II	UCH602.1	use the phase equilibrium concepts in mass transfer related problems.	**3**
		UCH602.2	solve problems related to adsorption.	**3**
		UCH602.3	solve problems related to liquid-liquid and solid-liquid extraction.	**3**
		UCH602.4	design different types of mass transfer equipment.	2
UCH603	Transport	UCH603.1	analyze heat, mass, and momentum transport in a process.	3
		UCH603.2	formulate problems along with appropriate boundary conditions.	3

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
Department of Chemical Engineering
BE (Chemical Engineering: 2020-21)

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COURSE No.	COURSE NAME		COs STATEMENT	Attainment Level
UCH603	Phenomena	UCH603.3	develop steady and transient solution for problems involving heat, mass, and momentum transport.	3
UCH605	Process Utility and Industrial Safety	UCH605.1	calculate the requirements of water and air and their applications as utilities.	**3**
		UCH605.2	calculate the steam requirement and its applications as utility.	**2**
		UCH605.3	evaluate and apply the various risk assessment methods in industries.	**3**
		UCH605.4	do the hazard analysis for different industries using HAZOP.	1
UCH802	Process Modeling and Simulation	UCH802.1	analyze physical and chemical phenomena involved in various process.	**3**
		UCH802.2	develop mathematical models for various chemical processes.	**2**
		UCH802.3	use various simulation approaches.	**3**
		UCH802.4	Simulate a process using process simulators (ASPEN Plus/ ASPEN Hysys).	3
		UCH793.1	Able to identify and use appropriate mathematical methods, numerical techniques and software tools for application to new and ill-defined engineering problems	3
		UCH793.2	Be able to integrate knowledge, handle complexity and formulate judgements with incomplete or limited information	3

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
Department of Chemical Engineering
BE (Chemical Engineering: 2020-21)

CO Attainment

COURSE No.	COURSE NAME		COs STATEMENT	Attainment Level
UCH793	Project Semester[#]	UCH793.3	Have the ability to redesign products, processes or systems in order to improve productivity, quality, safety and other desired needs	3
		UCH793.4	design methods, processes and techniques to unfamiliar, ill defined problems, involving other disciplines	3
		UCH793.5	Be able to design according to codes of practice and industry standards; to identify limitations of codes of practice and the need for their application	3
		UCH793.6	Have the ability to investigate and define a need and identify constraints including health, safety and legal issues and the impact of engineering solutions in a societal and environmental context;	3
		UCH793.7	Be able to make engineering judgements that take cognisance of the social, environmental, ethical, economic, financial, institutional and commercial considerations affecting the exercise of their engineering discipline	3
		UCH793.8	Have the ability to consult and work with experts in various fields in the realisation of a product or system	3
		UCH793.9	Have knowledge and understanding of concepts from a range of areas outside engineering	3
		UCH793.10	Be able, via knowledge and understanding of group dynamics, to exercise leadership	3

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
Department of Chemical Engineering
BE (Chemical Engineering: 2020-21)

CO Attainment

COURSE No.	COURSE NAME		COs STATEMENT	Attainment Level
		UCH793.11	Be able to select and apply appropriate communication tools and write technical papers and reports	3
		UCH793.12	Be able to describe the relevant advantages and disadvantages of various technologies to a audience, and to communicate effectively in public	3
UCH716	Food Engineering and Science	UCH716.1	calculate rheological properties of foods.	2
		UCH716.2	identify and evaluate various design parameters for equipment involved in thermal processing of Food	3
		UCH716.3	quantify thermal death of micro-organism and calculate spoilage probability	3
		UCH716.4	evaluate effect of food processing and packaging /storage on food quality	3
		UCH716.5	analyze food related hazards and HACCP method.	3
UCH712	Distillation Processes	UCH712.1	use the shortcut method for binary and multicomponent distillation.	3
		UCH712.2	solve problems related to binary and multi-component distillation.	3
		UCH712.3	use of operational and design aspects of enhanced distillation processes.	2
		UCH712.4	use the concepts of column sequencing for efficient separation.	3
UCH604	Biochemical Engineering	UCH604.1	calculate the kinetic parameters of enzymatic reactions.	**3**
		UCH604.2	calculate and analyze the kinetic parameters for microbial growth.	**3**

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
Department of Chemical Engineering
BE (Chemical Engineering: 2020-21)

CO Attainment

COURSE No.	COURSE NAME		COs STATEMENT	Attainment Level
	Engineering	UCH604.3	analyze bioprocess design and operation.	**3**
		UCH604.4	select suitable bioreactor.	3
UCH610	Process Equipment Design	UCH610.1	determine the parameters of equipment design and important steps involved in design.	3
		UCH610.2	design pressure vessels.	3
		UCH610.3	design different types of heat transfer equipment.	3
		UCH610.4	design different types of mass transfer equipment.	3
UCH611	Fluid Machinery	UCH611.1	perform calculations related to pumps and its operation	3
		UCH611.2	design pumps, compressors, and turbines	3
		UCH611.3	select the pumps, compressors, and turbines for various industrial needs and operations.	3
UCH801	Process Engineering and Plant Design	UCH801.1	apply various algorithms to synthesize a process flow sheet.	3
		UCH801.2	calculate different costs involved in a process plant.	3
		UCH801.3	calculate interest and time value of investments.	3
		UCH801.4	measure profitability on investments.	2
		UCH801.5	perform breakeven analysis and optimum design of a process.	2

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
Department of Chemical Engineering
BE (Chemical Engineering: 2020-21)

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COURSE No.	COURSE NAME		COs STATEMENT	Attainment Level
UCH893	Capstone Project	UCH893.1	design a chemical process/plant system implementing an integrated approach applying knowledge accrued in various professional courses.	3
		UCH893.2	work in a team and demonstrate their role in the team work.	3
		UCH893.3	design, analyze and optimize the design of a chemical process/plant considering various requirements like reliability, optimized design, manufacturing, assembly, installation, maintenance, cost and use of design standards and industry standards.	3

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
Department of Chemical Engineering
BE (Chemical Engineering: 2020-21)

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COURSE No.	COURSE NAME		COs STATEMENT	Attainment Level
UCH854	Elective-III***Polymer Science & Technology	UCH854.1	Identify the synthesis technique for different polymers	2
		UCH854.2	Differentiate various polymers on the basis of their thermal transitions and molecular weight.	2
		UCH854.3	Analyze the various polymer processing techniques.	3
		UCH854.4	Carry out a comparative analysis of the properties and applications of polymer	3
UCH850	Elective-IV*** Petroleum & Petrochemicals	UCH850.1	select the appropriate characterization parameters.	3
		UCH850.2	specify the properties of petroleum products.	3
		UCH850.3	attain knowledge of various separation & conversion processes involved in petroleum refining	3
		UCH850.4	attain knowledge of manufacturing of various petrochemical products	3

PO Attainment (2020-21)

PO Statement		Attinmnet Level
PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**2.74**
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	**2.69**
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	**2.71**
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	**2.79**
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	**2.85**
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	**2.53**
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	**2.80**
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	**2.87**

PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	**2.91**
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	**2.86**
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	**2.71**
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	**2.78**
PSO Attainment (2020-21)		
PSO1	**Core competency**: Basic knowledge of chemical engineering principles including unit operations, thermodynamics and reaction engineering.	**2.74**
PSO2	**Application competency**: Ability to analyse, design and control of chemical processes in an economical and sustainable manner.	**2.80**