

**SEMESTER WISE COURSE STRUCTURE  
& EVALUATION SCHEME**

**for**

**B. TECH. DEGREE PROGRAMME  
IN  
CHEMICAL TECHNOLOGY  
PLASTIC TECHNOLOGY  
(Effective from the session 2022-23)**



**DEPARTMENT OF PLASTIC TECHNOLOGY  
SCHOOL OF CHEMICAL TECHNOLOGY  
HARCOURT BUTLER TECHNICAL UNIVERSITY  
KANPUR-208002  
UTTAR PRADESH**

## **Department of Chemical Technology-Plastic Technology**

### **Vision**

**“The department of chemical technology-plastic technology aspires to achieve excellence in technical knowledge and skill, research and innovation in Plastics and Allied areas”**

### **Mission**

The mission of the Department of Chemical Technology- Plastic Technology are:

- M 1      To develop state-of-the-art facilities to impart technical knowledge and skill to the graduate & post graduate students for plastic and allied industries and research organizations
- M2        To be a center of research and innovation for betterment of society in sustainable manner.
- M3        To develop state-of-the-art technologies for testing and consultancy for industry and Society
- M4        To cultivate strong ethical values to be a successful professionals and to become life-long learners

### **Program Educational Objectives (PEOs)**

The Program Educational Objectives (PEOs) of B.Tech. Chemical Technology-Plastic Technology program are:

- PEO1**      : Graduates will be technically competent in the field of polymers, resins, processing and allied areas to cater the need of country.
- PEO2**      : Graduates will be able to innovate in designs, production of materials and processes for sustainable development of society.
- PEO3**      : Graduates will serve the industry to meet the challenges in terms of quality assurance and standardization to with stand the global competitiveness.
- PEO4**      : Graduates will discharge duties with professional attitudes and ethics.

### **Program Specific Outcomes:**

- PSO1**        :      to apply practical skills, technical knowledge in major streams such as chemistry, manufacturing, processing, and applications areas of engineering and technology in plastic and allied industries
- PSO2**        :      to take-up career in research organizations or to pursue higher studies in plastic technology and interdisciplinary programs with high regard for ethical values, environmental and social issues.

### 1.5. Establish consistency of PEOs with Mission of the Department (10)

*(Generate a “Mission of the Department – PEOs matrix” with justification and rationale of the mapping)*

**Table : B.1.5**

PEO Statements		M1	M2	M3	M4
<b>PEO1:</b>	Graduates will be technically competent in the field of polymers, resins, processing and allied areas to cater the need of country.	3	1	2	2
<b>PEO2:</b>	Graduates will be able to innovate in designs, production of materials and processes for sustainable development of society.	3	2	2	1
<b>PEO3:</b>	Graduates will serve the industry to meet the challenges in terms of quality assurance and standardization to with stand the global competitiveness.	3	2	2	2
<b>PEO4:</b>	Graduates will discharge duties with professional attitudes and ethics.	3	2	2	3

PEO	M1 (State-of-the art technology)	M2 ( Research and Innovation)	M3 (Training and consultancy)	M4 (Ethical Values)
<b>PEO1</b>	Good facilities are required to train graduates with high level of skills and technical knowledge	Graduates should have inclination towards research and innovation for growth of industry or organization	Graduates should have expertise in testing and characterization of polymers and related materials for developments in industry or organization	Graduates should have good professional attitude along with technical knowledge
<b>PEO2</b>	Graduates should have good technical knowledge for innovative designs of new products and processes	Graduates should have innovative approach for finding solutions to problems in society	Graduates should have skills for working on modern tools required for development	Graduates should be able to analyze impact of development on society
<b>PEO3</b>	Graduates should have good technical knowledge for meeting challenges in professional carrier with confidence	Graduates should have innovative approach for continuous growth of industry or organization	Graduates should have good knowledge for handling real time problems	Graduates should have knowledge of laws and legislations for sustainable progress
<b>PEO4</b>	Graduates should have good knowledge regulations followed in industry	Graduates should be aware of impact of research and development on environment	Graduates should be able to focus on analyzing professional ethics required in future	Graduates should focus on overall development of stakeholders of industry and society

### **Program Outcomes (POs) of B. Tech. Chemical Technology - Plastic Technology**

Graduating Students of B. Tech. Chemical Technology - Plastic Technology program will be able to:

<b>Program Outcomes (POs)</b>		<b>Graduate Attributes(GAs)</b>
PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	Engineering Knowledge
PO2	Identify, formulate, review research literature, and analyses complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	Problem Analysis
PO3	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.	Design/Development of solutions
PO4	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.	Conduct Investigations of complex problems
PO5	Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.	Modern Tool Usage
PO6	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.	The Engineer & Society
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	Environment and sustainability
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	Ethics
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	Individual and team work
PO10	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.	Communication
PO11	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.	Project management and finance
PO12	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.	Life-long learning

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## B.TECH. PLASTIC TECHNOLOGY

## Semester wise course structure

**(Applicable from Session 2022-23 for new entrants)**

## Year I, Semester I

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
1.	BSC	Engineering. Physics	BPH-	4	3	0	2	15	20	15	50	50	100
2.	BSC	Engineering Mathematics-I	BMA-	4	3	1	0	30	20	-	50	50	100
3.	ESC	Introduction to Electrical Engineering	EEE-	4	3	0	2	15	20	15	50	50	100
4.	ESC	Introduction to Mechanical Engineering .	EME-	4	3	1	0	30	20	-	50	50	100
5.	HSMC	Professional Communication	HHS-	4	2	1	2	15	20	15	50	50	100
6.	ESC	Engineering Graphics	ECE-	2	0	0	4	30	20	-	50	50	100
Total Credits: 22												600	

## Year I, Semester II

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
1.	BSC	Engineering. Chemistry	BCY-	4	3	0	2	15	20	15	50	50	100
2.	ESC	Introduction to Computer Science & Engineering	ECS-	4	3	1	0	30	20	-	50	50	100
3.	ESC	Introduction to Electronics Engineering	ETE-	4	3	1	0	30	20	-	50	50	100
4.	ESC	Introduction to Civil Engineering	ECE-	4	3	1	0	30	20	-	50	50	100
5.	ESC	Introduction to Chemical Engineering & Chemical Technology	ECT-	4	3	1	0	30	20	-	50	50	100
6.	ESC	Workshop Practice	EWS	2	0	0	4	-	20	30	50	50	100
Total Credits: 22												600	

### Year II, Semester III

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
1.	BSC	Modern Analytical Techniques (MAT)	BCY-	4	3	1	0	30	20	-	50	50	100
2.	ESC	Computer Oriented Numerical Methods(CONM)	BMA-	4	3	0	2	15	20	15	50	50	100
3.	PCC	Processing of Polymers -I (PP-I)	TPL-252	4	3	0	2	15	20	15	50	50	100
4.	PCC	Chemical Engineering Thermodynamics (CET)	TPL-254	4	3	1	0	30	20	-	50	50	100
5.	PCC	Heat Transfer Operation (HTO)	TPL-256	3	3	0	0	30	20	-	50	50	100
6.	PCC	Polymerization Engineering-II (PE-II)	TPL-258	3	3	0	0	30	20	-	50	50	100
7.	PCC	Polymerization Engineering Lab ( PE LAB)	TPL-260	2	0	0	4	-	20	30	50	50	100
Total Credits: 24												700	

## Year III, Semester V

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**700**

**Year III, Semester VI**

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**700**

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**B.TECH. PLASTIC TECHNOLOGY**  
**Semester wise course structure**  
**(Applicable from Session 2025-26 for new entrants)**  
**Year IV, Semester VII**

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
1.	PEC-II	Program Elective-II											
		Plastic Packaging (PP)	TPL-451	4	3	1	0	30	20	-	50	50	100
		Polymer Adhesives (PA)	TPL-453	4	3	1	0	30	20	-	50	50	100
		Plastic Product Technology (PPT)	TPL-455	4	3	1	0	30	20	-	50	50	100
2.	PEC-III	Program Elective-III											
		Fiber and Film Technology (FFT)	TPL-457	3	3	0	0	30	20	-	50	50	100
		Polymer Coating Technology (PCT)	TPL-459	3	3	0	0	30	20	-	50	50	100
		Polymer Foams (PF)	TPL-461	3	3	0	0	30	20	-	50	50	100
3.	PEC-IV	Program Elective -IV											
		High Performance Polymer Materials (HPPM)	TPL-463	3	3	0	0	30	20	-	50	50	100
		Polymer Nano-composites (PNC)	TPL-465	3	3	0	0	30	20	-	50	50	100
		Polymer Blends (PB)	TPL-467	3	3	0	0	30	20	-	50	50	100
4.	Industrial Training	Industrial Training (IT)	TPL-469	2	0	0	4	-	20	30	50	50	100
5.	OEC-II	Basics of Polymer Processing (BPP)	OPL-451	2	2	0	0	30	20	-	50	50	100
6.	Minor Project	Minor Project	TPL-471	6	0	0	12	-	20	30	50	50	100
7.	Seminar	Seminar	TPL-473	2	0	0	4	-	50	-	50	50	100
<b>Total Credits: 22</b>													<b>700</b>

**Year IV, Semester VIII**

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
1.	PEC-V	Program Elective -V											
		Plastic Waste Management (PWM)	TPL-452	4	3	1	0	30	20	-	50	50	100
		Characterization of Polymers (COP)	TPL-454	4	3	1	0	30	20	-	50	50	100
		Specialty Polymers (SP)	TPL-256	4	3	1	0	30	20	-	50	50	100
2.	OEC-III	Testing of Polymers (TOP)	OPL-452	2	2	0	0	30	20	-	50	50	100
3.	Project	Project	TPL-458	16	0	0	24	-	100	100	200	200	400
<b>Total Credits: 22</b>													<b>600</b>

**Total Program Credits: 180**



## OEC

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
1.	OEC-I	Introduction to Polymer Science (IPS)	OPL-352	2	2	0	0	30	20	-	50	50	100
2.	OEC-II	Basics of Polymer Processing (BPP)	OPL-451	2	2	0	0	30	20	-	50	50	100
3.	OEC-III	Testing of Polymers (TOP)	OPL-452	2	2	0	0	30	20	-	50	50	100

## PEC-I

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
1.	PEC-I	Process Equipment Design	TPL-362	3	3	0	0	30	20	-	50	50	100
2.	PEC-I	Process Modeling & Simulation	TPL-364	3	3	0	0	30	20	-	50	50	100
3.	PEC-I	Process Optimization	TPL-366	3	3	0	0	30	20	-	50	50	100

## PEC-II

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
1.	PEC-II	Plastic Packaging (PP)	TPL-451	4	3	1	0	30	20	-	50	50	100
2.	PEC-II	Polymer Adhesives (PA)	TPL-453	4	3	1	0	30	20	-	50	50	100
3.	PEC-II	Plastic Product Technology (PPT)	TPL-455	4	3	1	0	30	20	-	50	50	100

## PEC-III

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
1.	PEC-III	Fiber and Film Technology (FFT)	TPL-457	3	3	0	0	30	20	-	50	50	100
2.	PEC-III	Polymer Coating Technology (PCT)	TPL-459	3	3	0	0	30	20	-	50	50	100
3.	PEC-III	Polymer Foams (PF)	TPL-461	3	3	0	0	30	20	-	50	50	100

## PEC-IV

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
1.	PEC-IV	High Performance Polymer Materials (HPPM)	TPL-463	3	3	0	0	30	20	-	50	50	100
2.	PEC-IV	Polymer Nano-composites (PNC)	TPL-465	3	3	0	0	30	20	-	50	50	100
3.	PEC-IV	Polymer Blends (PB)	TPL-467	3	3	0	0	30	20	-	50	50	100

## PEC-V

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
1.	PEC-V	Plastic Waste Management (PWM)	TPL-452	4	3	1	0	30	20	-	50	50	100
2.	PEC-V	Characterization of Polymers (COP)	TPL-454	4	3	1	0	30	20	-	50	50	100
3.	PEC-V	Specialty Polymers (SP)	TPL-256	4	3	1	0	30	20	-	50	50	100

### **Courses for Minor Degree :**

**Name of Minor Degree : Plastic Processing Technology**

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
(i)	PCC	Introduction to Polymer Chemistry (ITPC)	TPL-251	4	3	1	0	30	20	-	50	50	100
(ii)	PCC	Processing of Polymers-I (POP-I)	TPL-252	4	4	3	0	2	15	-	50	50	100
(iii)	PCC	Processing of Polymers-II (POP-II)	TPL-351	4	4	3	0	2	15	-	50	50	100
(iv)	PCC	Plastic Mould Design and Dies(PMDD)	TPL-353-	4	3	1	0	30	20	-	50	50	100
(vi)	PEC-III	Plastic Product Technology (PPT)	TPL-455	4	3	1	0	30	20	-	50	50	100
Total Credits: 20													600

### **Decisions of Course Structure Committee/ Committee of Implementation of NEP-2022**

1. Award of certificate in Engineering and Technology on exit after completion of 1<sup>st</sup> year B.Tech program.
2. Award of Diploma in the Branch of Study ( Plastic Technology) after completion of 2<sup>nd</sup> year B.Tech program.
3. The students of four year B.Tech. program completing courses with additional credits of 20 or more in their respective branch of study will be awarded degree of B.Tech Honours. The students can opt for additional courses from the list of PEC or from the online platform.
4. The students of four year B.Tech. program completing courses with additional credits of 20 or more in the area other than their branch of study will be awarded degree of B.Tech with major in their respective branch of study along with Minor degree in the area of specialization of additional courses.