

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:

- M1 :** 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.

Consistency of PEOs with Mission of the Department

PEO Statements		M1	M2	M3	M4
PEO1:	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
PEO2:	Graduates will be able to innovate in designs, production of materials and processes for sustainable development of society.	3	2	2	1
PEO3:	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
PEO4:	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)
PEO1	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
PEO2	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
PEO3	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
PEO4	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:

Program Outcomes (POs)		Graduate Attributes(GAs)
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

HARCOURT BUTLER TECHNICAL UNIVERSITY
KANPUR
SCHOOL OF CHEMICAL TECHNOLOGY
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	NPH 101	4	3	0	2	15	20	15	50	50	100
2.	BSC	Engineering Mathematics-I	NMA 101	4	3	1	0	30	20	-	50	50	100
3.	ESC	Introduction to Electrical Engineering	NEE 101	4	3	0	2	15	20	15	50	50	100
4.	ESC	Introduction to Mechanical Engineering .	NME 101	4	3	1	0	30	20	-	50	50	100
5.	HSMC	Professional Communication	NHS 101	4	2	1	2	15	20	15	50	50	100
6.	ESC	Engineering Graphics	NCE 103	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	NCY 102	4	3	0	2	15	20	15	50	50	100
2.	ESC	Introduction to Computer Science & Engineering	NCS 102	4	3	1	0	30	20	-	50	50	100
3.	ESC	Introduction to Electronics Engineering	NET 102	4	3	1	0	30	20	-	50	50	100
4.	ESC	Introduction to Civil Engineering	NCE 102	4	3	1	0	30	20	-	50	50	100
5.	ESC	Introduction to Chemical Engineering & Chemical Technology	NCT 102	4	3	1	0	30	20	-	50	50	100
6.	ESC	Workshop Practice	NWS 102	2	0	0	4	-	20	30	50	50	100
Total Credits: 22													600

HARCOURT BUTLER TECHNICAL UNIVERSITY
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SCHOOL OF CHEMICAL TECHNOLOGY
B.TECH. PLASTIC TECHNOLOGY

Semester wise course structure
(Applicable from Session 2023-24 for new entrants)

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	Engineering Mathematics-II	NMA 201	4	3	1	0	30	20	-	50	50	100
2.	ESC	Fluid Mechanics & Mechanical Operations (FMMO)	NCT 201	4	3	0	2	15	20	15	50	50	100
3.	PCC	Introduction to Polymer Chemistry (ITPC)	NPL 201	4	3	1	0	30	20	-	50	50	100
4.	PCC	Polymerization Engineering-I (PE-I)	NPL 203	4	3	0	2	15	20	15	50	50	100
5.	PCC	Chemical Process Calculations (CPC)	NCT 203	3	3	0	0	30	20	-	50	50	100
6.	HSMC	Industrial Economics & Management	NHS 201	3	3	0	0	30	20	-	50	50	100
7.	PCC	Polymer Chemistry LAB (PC LAB)	NPL 205	2	0	0	4	-	20	30	50	50	100
Total Credits: 24												700	

Year II, Semester IV

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)	NCY 202	4	3	1	0	30	20	-	50	50	100
2.	ESC	Computer Oriented Numerical Methods(CONM)	NMA 204	4	3	0	2	15	20	15	50	50	100
3.	PCC	Processing of Polymers -I (PP-I)	NPL 202	4	3	0	2	15	20	15	50	50	100
4.	PCC	Chemical Engineering Thermodynamics (CET)	NCT 204	4	3	1	0	30	20	-	50	50	100
5.	PCC	Heat Transfer Operation (HTO)	NCT 206	3	3	0	0	30	20	-	50	50	100
6.	PCC	Polymerization Engineering-II (PE-II)	NPL 204	3	3	0	0	30	20	-	50	50	100
7.	PCC	Polymerization Engineering Lab (PE LAB)	NPL 206	2	0	0	4	-	20	30	50	50	100
Total Credits: 24												700	

HARCOURT BUTLER TECHNICAL UNIVERSITY KANPUR
SCHOOL OF CHEMICAL TECHNOLOGY
B.TECH. PLASTIC TECHNOLOGY

Semester wise course structure

(Applicable from Session 2024-25 for new entrants)

Year III, Semester V

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
1.	PCC	Processing of Polymers -II (PP-II)	NPL 301	4	3	0	2	15	20	15	50	50	100
2.	PCC	Plastic Mould Design and Dies(PMDD)	NPL 303	4	3	1	0	30	20	-	50	50	100
3.	PCC	Polymer Rheology and Testing (PRT)	NPL 305	3	3	0	0	30	20	-	50	50	100
4.	PCC	Mass Transfer Operation	NCT 307	3	3	0	0	30	20	-	50	50	100
5.	PCC	Chemical Reaction Engineering (CRE)	NCT 309	3	3	0	0	30	20	-	50	50	100
6.	PCC	Polymer Testing Lab (PT LAB)	NPL 307	3	0	0	6	-	20	30	50	50	100
7.	HSMC	Entrepreneurship Development(ED)	NHS 351	2	2	0	0	30	20	-	50	50	100
Total Credits: 22												700	

Year III, Semester VI

Sl. No.	Course Type	Course Title	Subject Code	Credits	Periods			Sessional Marks				ESE	Total Marks
					L	T	P	MSE	TA	Lab	Total		
1.	PCC	Instrumentation & Process Control (IPC)	NCT 302	4	3	0	2	15	20	15	50	50	100
2.	PCC	Structure & Properties Relationship of Polymers (SPRP)	NPL 302	4	3	1	0	30	20	-	50	50	100
3.	PCC	Rubber Technology (RT)	NPL 304	3	3	0	0	30	20	-	50	50	100
4.	PCC	Polymer Composite (PC)	NPL 306	3	3	0	0	30	20	-	50	50	100
5.	PCC	Polymer Characterization Lab (PC LAB)	NPL 308	3	0	0	6	-	20	30	50	50	100
6.	PEC-I	Program Elective –I											
		Process Equipment Design (PED)	NCT 322	3	3	0	0	30	20	-	50	50	100
		Process Modeling & Simulation (PMS)	NCT 324	3	3	0	0	30	20	-	50	50	100
		Process Optimization (PO)	NCT 326	3	3	0	0	30	20	-	50	50	100
7.	OEC-I	Introduction to Polymer Science (IPS)	OPL 302	2	2	0	0	30	20	-	50	50	100
Total Credits: 22												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)	NPL 421	4	3	1	0	30	20	-	50	50	100
		Polymer Adhesives (PA)	NPL 423	4	3	1	0	30	20	-	50	50	100
		Plastic Product Technology (PPT)	NPL 425	4	3	1	0	30	20	-	50	50	100
2.	PEC-III	Program Elective-III											
		Fiber and Film Technology (FFT)	NPL 441	3	3	0	0	30	20	-	50	50	100
		Polymer Coating Technology (PCT)	NPL 443	3	3	0	0	30	20	-	50	50	100
		Polymer Foams (PF)	NPL 445	3	3	0	0	30	20	-	50	50	100
3.	PEC-IV	Program Elective -IV											
		High Performance Polymer Materials (HPPM)	NPL 461	3	3	0	0	30	20	-	50	50	100
		Polymer Nano-composites (PNC)	NPL 463	3	3	0	0	30	20	-	50	50	100
		Polymer Blends (PB)	NPL 465	3	3	0	0	30	20	-	50	50	100
4.	Industrial Training	Industrial Training (IT)	NPL 481	2	0	0	4	-	20	30	50	50	100
5.	OEC-II	Basics of Polymer Processing (BPP)	OPL 401	2	2	0	0	30	20	-	50	50	100
6.	Minor Project	Minor Project	NPL 491	6	0	0	12	-	20	30	50	50	100
7.	Seminar	Seminar	NPL 471	2	0	0	4	-	50	-	50	50	100
Total Credits: 22													700

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)	NPL 422	4	3	1	0	30	20	-	50	50	100
		Characterization of Polymers (COP)	NPL 424	4	3	1	0	30	20	-	50	50	100
		Specialty Polymers (SP)	NPL 426	4	3	1	0	30	20	-	50	50	100
2.	OEC-III	Testing of Polymers (TOP)	OPL 402	2	2	0	0	30	20	-	50	50	100
3.	Project	Project	NPL 492	16	0	0	24	-	100	100	200	200	400
Total Credits: 22													600

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 302	2	2	0	0	30	20	-	50	50	100
2.	OEC-II	Basics of Polymer Processing (BPP)	OPL 401	2	2	0	0	30	20	-	50	50	100
3.	OEC-III	Testing of Polymers (TOP)	OPL 402	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	NCT 322	3	3	0	0	30	20	-	50	50	100
2.	PEC-I	Process Modeling & Simulation	NCT 324	3	3	0	0	30	20	-	50	50	100
3.	PEC-I	Process Optimization	NCT 326	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)	NPL 421	4	3	1	0	30	20	-	50	50	100
2.	PEC-II	Polymer Adhesives (PA)	NPL 423	4	3	1	0	30	20	-	50	50	100
3.	PEC-II	Plastic Product Technology (PPT)	NPL 425	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)	NPL 441	3	3	0	0	30	20	-	50	50	100
2.	PEC-III	Polymer Coating Technology (PCT)	NPL 443	3	3	0	0	30	20	-	50	50	100
3.	PEC-III	Polymer Foams (PF)	NPL 445	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)	NPL 461	3	3	0	0	30	20	-	50	50	100
2.	PEC-IV	Polymer Nano-composites (PNC)	NPL 463	3	3	0	0	30	20	-	50	50	100
3.	PEC-IV	Polymer Blends (PB)	NPL 465	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)	NPL 422	4	3	1	0	30	20	-	50	50	100
2.	PEC-V	Characterization of Polymers (COP)	NPL 424	4	3	1	0	30	20	-	50	50	100
3.	PEC-V	Specialty Polymers (SP)	NPL 426	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)	NPL 201	4	3	1	0	30	20	-	50	50	100
(ii)	PCC	Processing of Polymers-I (POP-I)	NPL 202	4	4	3	0	2	15	-	50	50	100
(iii)	PCC	Processing of Polymers-II (POP-II)	NPL 301	4	4	3	0	2	15	-	50	50	100
(iv)	PCC	Plastic Mould Design and Dies(PMDD)	NPL 303	4	3	1	0	30	20	-	50	50	100
(vi)	PEC-III	Plastic Product Technology (PPT)	NPL 405	4	3	1	0	30	20	-	50	50	100
Total Credits: 20													600