COURSE OUTCOMES

DEPARTMENT OF PLASTIC & POLYMER ENGINEERING

COLLEGE OF ENGINEERING ROORKEE

ACADEMIC YEAR – 2020-21

Preface

This document presents a compilation of the Course Outcomes (COs) for all subjects taught in a program leading to degree in B**. Tech (Plastic & Polymer Engineering)**.The COs outline a few (about 5) significant learning outcomes that a student is expected to learn while studying the subject. Besides, each Course Outcome is associated with one or more of the 5 Blooms Taxonomy Levels as listed below:

Bloom's Levels	Bloom'sTaxonomy
1	Remember and Understand (Referred to as 'Understand' in all Course outcomes)
2	Apply
3	Analyze
4	Evaluate
5	Create

At the College of Engineering Roorkee (COER), the curriculum is prescribed by the affiliating University. Efforts are made to make the teaching learning process Outcome Based Education (OBE) oriented. Outcome-based educationoffers a powerful managing technical education to be effective in its goals.

The OBE process started at COER systems in 2018 and went through evolution phases. This document presents consolidated Course Outcomes (CO) of the all courses offered in the academic year 2020-21. For this purpose, Course Outcome (CO) committees were formed, which consisted Dean Academics, Head of the Department and a senior faculty members of the respective departments. They defined COs for each course by referring to contents of the respective syllabus. Bloom's Taxonomy levels were also assigned for each identified CO.

Head **Dean Academics**

Teaching Scheme: B.Tech.(Plastic and Polymer Engineering)

Semester: 3rd

S. No	Subject's Title	Subject Code	L	T	P	Credits
1	Mathematics-III	BAST 301	3	1	0	4
2	Basic Thermodynamics	BMET 302	3	1	0	4
3	Material Science and Technology	BMET 303	3	0	0	3
4	Material Science and Technology Lab	BMEP 303	0	0	2	1
5	Object Oriented Programming and Methodology	BCST 305	3	1	0	4
6	Object Oriented Programming and Methodology Lab	BCSP 305	0	0	2	1
7	Introduction to Polymer Science	BPPT -301	3	1	0	4

Semester: 4th

S. No	Subject's Title	Subject Code	L	T	P	Credits
1	Energy and Environment Engineering	BECT 402	3	1	0	4
2	Polymer Chemistry	BPPT 401	3	1	0	4
3	Polymer Chemistry Lab	BPPP 401	0	0	2	1
4	Thermoplastic Materials	BPPT 402	3	1	0	4
5	Thermoplastic Materials Lab	BPPP 402	0	0	2	1
6	Thermoset Materials	BPPT 403	3	1	0	4
7	Thermoset Materials Lab	BPPP 403	0	0	2	1
8	Fluid Mechanics	BMET 404	3	0	0	3
9	Fluid Mechanics Lab	BMEP 401	0	0	2	1

Semester: 5th

S. No	Subject's Title	Subject Code	L	T	P	Credits
1	Polymer Structure & Properties Relationship	TPP-501	3	1	0	4
2	Polymer Rheology	TPP-502	3	1	0	4
3	Characterization of Polymers	TPP-503	3	1	0	4
4	Plastic Processing -I	TPP-504	3	1	0	4
5	Plastic Testing Techniques	TPP-505	3	1	0	4
6	Plastic Product & Mold Design	TPP-506	3	1	0	4
7	Synthesis & Polymerization Lab	PPP-551	0	0	3	2
8	Plastic Processing Lab	PPP-554	0	0	3	2

Semester: 6th

S. No	Subject's Title	Subject Code	L	T	P	Credits
1	Polymeric Adhesives & Sealants	TPP-601	3	1	0	4
2	Polymer Blends & Composites	TPP-602	3	1	0	4
3	Plastics Packaging Technology	TPP-603	3	1	0	4
4	Additives & Compounding	TPP-604	3	1	0	4
5	Plastic Waste Management & Recycling	TPP-605	3	1	0	4
6	Plastic Processing - II	TPP-606	3	1	0	4
7	Plastic Material Testing Lab	PPP-651	0	0	3	2

Semester: 7th

S. No	Subject's Title	Subject Code	L	T	P	Credits
1	Industrial Safety & Hazard Management	TPP-701	3	1	0	4
2	CAD/CAM	TME-701	3	1	0	4
3	Nylon Technology	TPP-702	3	1	0	4
4	Fiber Manufacturing Technology	TPP-703	3	1	0	4
5	Open Elective	TOE-	3	1	0	4
6	Polymer Characterization Lab	PPP-701	0	0	3	3

Semester: 8th

S. No	Subject's Title	Subject Code	L	T	P	Credits
1	Total Quality Management	TME-020	3	1	0	4
2	Surface Coating Technology	TPP-801	3	1	0	4
3	Polyurethane Technology	TPP-803	3	1	0	4
4	Technology of Elastomers	TPP-804	3	1	0	4

Program Educational Objectives (PEOs)

PEO1 To equip the students with lifelong skills so that they can work and contribute to the infrastructural development projects of the public and private sectors

PEO2 To provide research oriented education with knowledge of state-of-art analytical and experimental tools to enable students to pursue higher studies in institutions of repute in India and abroad

PEO3 To provide skill enriched education and training through internships to enable students to launch start-ups in their field of study

PEO4 To inculcate culture of professionalism, ethical conduct, team work with good communication skills to enable the students to be successful in their career

Program Specific Outcomes (PSOs)

PSO1 The students will acquire comprehensive understanding of concepts, analysis, operation and performance of all major aspects of information technology such as computer networks, information security, operating system, algorithms, Human computer interaction, data analytics, artificial intelligence and applications, cloud computing and programming languages.

PSO2 The students will have knowledge of advanced programming languages and analytical tools to deliver solution to the end users.

PSO3 The student will have rigorous training on experimental support to the theoretical concepts

PSO4 The students will have acquired ability to understand the scope of research work in major streams

Program Outcomes (POs)

PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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.

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.

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.

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.

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.

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.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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.

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.

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.

Course Outcomes (COs)

Course Name: Introduction to Polymer Science
Course Code: BPPT 301

The students will be able to:

	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO1	Understand basic concept of polymers like monomer, oligomer, polymerization, types of polymers and their properties, concept of number average molecular weight,Weight average molecular weight, Molecular weight distribution, different kind of polymer and their properties, concept of Crystallinity in polymer and its effect on polymer properties, Glass transition temperature and Melting point of polymer and their relation with polymer properties,process of polymer degradation,behavior of polymer solution at different concentration.	**Understand Apply**	B.L-1
CO2	Identify the effect of variation in polymer structures on crystallinity and polymer properties.	**Apply**	B.L-2
CO3	Analyze the effect of variation in polymer structures on glass transition temperature (Tg) and melting point (Tm) and polymer processing & properties.	**Analyze Evaluate**	B.L-4
CO4	Demonstrate the knowledge of different kind of polymer degradation can occur during processing and use of polymers.	**Apply Analyze**	B.L-3
CO 5	Evaluate the effect of nature, size and shape of polymer molecules on the behavior of solution of polymer.	**Evaluate Create**	B.L-5

Course Name: Polymer Chemistry

Course Code: BPPT-401

The students will be able to:

	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO1	Concept and theory of polymerization reactions & techniques viz Condensation polymerization, Free radical polymerization and their reaction mechanisms with reaction kinetics, various free radical polymerization techniques vizmass (bulk), suspension, emulsion and solution processes .Concept of Auto- acceleration. , role of inhibitor, retarders, chain transfer agents. Methodology for control of molecular weight of polymer. Effect of temperature on polymerization, kinetics & mechanism. Kinetics and utility of copolymerization reaction.	**Understand Apply**	B.L-1
CO2	To select an appropriate polymerization technique for control of exothermic reaction of polymerization and manufacture of a polymer of desired physical form.	**Apply Analyze**	B.L-2
CO3	Evaluate various factors like nature of monomer, type of initiator, emulsifiers etc. to produce polymer of desired physical form and also evaluate the effects of various reaction kinetics parameters viz temperature ,type of catalyst, ratio of reactants on the speed of reaction, molecular weight distribution of polymer produced by condensation polymerization.	**Evaluate Create**	B.L-4
CO4	Select appropriate chain transfer agents, type & quantity of initiator to produce a polymer of desired degree of polymerization by free radical polymerization and then developing a copolymer of desired composition and properties through selection of a pair of monomers of required reactivity ratio.	**Evaluate Create**	B.L-5
CO 5	Evaluate the effect of reactivity ratio of monomers on the type of copolymer and copolymer composition to produce a copolymer of desired properties,	**Analyze Evaluate**	B.L-4

Course Name: Thermoplastic Materials
Course Code: BPPT-402

The students will be able to:

	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO1	Acquire knowledge about the Raw materials, manufacturing technology; quality control tests etc. involved during the manufacture various engineering and commodity thermoplastic materials including their properties and applications.	**Understand Apply**	B.L-1
CO2	To select thermoplastic material suitable to end use of plastic product.	**Apply Analyze**	B.L-3
CO3	Analyze the various physical, chemical and electrical properties of various thermoplastic materials.	**Analyze Evaluate**	B.L-4
CO4	Identify specific method to synthesize a polymer for a new application such as high temperature application, then selecting appropriate chain transfer agents, type & quantity of initiator to produce a polymer of desired degree of polymerization by free radical polymerization	**Apply Analyze**	B.L-2
CO5	Evaluate the various process parameters employed during manufacture of a thermoplastic material.	**Evaluate Create**	B.L-5

Course Name: Thermoset Materials
Course Code: BPPT-403

The students will be able to:

	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO 1	Acquire knowledge about the Raw materials, manufacturing technology; quality control tests etc. involved during the manufacture various thermoset materials including their properties and applications.	**Understand Apply**	B.L-1
CO 2	To select a thermoset resin suitable to end use of plastic product.	**Apply Analyze**	B.L-3
CO 3	Analyze the various physical, chemical and electrical properties of various thermoset materials, identify specific method to synthesize a polymer for a new application such as high temperature application	**Analyze Evaluate**	B.L-4
CO 4	Select appropriate curing agents suitable to the type of thermoset resin to modify the composition of a thermoset resin to obtain desirable properties.	**Apply**	B.L-2
CO 5	Evaluate the various process parameters employed during manufacture of a thermoset material.	**Evaluate Create**	B.L-5

Course Name: Polymer Structure and Properties Relationship
Course Code: TPP 501

The students will be able to:

	COURSE OUTCOMES	BLOOM'S TAXONOMY	BLOOM'S LEVEL (B.L)
CO1	Understand different types of polymer structures, their co-relation with physical, chemical, thermal, optical and electrical properties of polymers.	**Understand Apply**	**B.L-1**
CO2	Understand the significance and concepts of testing procedures used for all mechanical properties of polymers/plastic materials.	**Understand Apply**	**B.L-2**
CO3	Remember the various formulas relating properties with structural parameters of the polymers.	**Apply Analyze**	**B.L-3**
CO4	Predict the desired properties from the structure of a given polymer.	**Apply Evaluate**	**B.L-4**
CO5	Analyze structure and properties of various polymers to suggesta specific polymer for a desired application.	**Analyze Create**	**B.L-5**

Course Name: Polymer Rheology
Course Code: TPP 502

The students will be able to:

	Course Outcomes	Bloom's Taxonomy	Bloom's Level (B.L)
CO1	Understand Rheological behavior of Newtonian non-Newtonian fluids, different kind of stresses encountered during processing plastic melts, principle, construction features & operation of different mixing , compounding, and calendaring machines equipments used for plastic materials and different kind of instruments used for rheological properties of polymers. Understand the various mechanical models used to predict the flow behavior of a plastic product during its service.	**Understand Apply**	**B.L-1**
CO2	Remember the formulas relating the flow behavior of fluids and its physical properties.	**Understand Apply**	**B.L-2**
CO3	Analyze the measured rheological properties of polymer melts.	**Analyze Evaluate**	**B.L-4**
CO4	Apply the concept of rheology to polymer processing.	**Apply Analyze**	**B.L-3**
CO 5	Construct a mechanical model for viscoelastic behavior of polymer melt.	**Create**	**B.L-5**

Course Name: Characterization of Polymers
Course Code TPP 503

The students will be able to:

	Course Outcomes	**Bloom's Taxonomy**	**Bloom's Level (B.L)**
CO1	Understand theory and basic principle of spectroscopy, optical microscopy, chromatography,Gel Permeation Chromatography, Cryoscopy, Ebulliomety, Vapor Phase Osmometry, Membrane Osmometry and light scattering etc. and their application for design of modern analytical instruments used qualitative, quantitative analysis and Number Mn and weight Mw average molecular weights of polymers.	**Understand Apply**	**B.L-1**
CO2	Apply basic concept of microscopy and its application to optical microscope, SEM, TEM and XRD used for study of the structure of molecules of polymers & plastic products for failure analysis.	**Apply Analyze**	**B.L-3**
CO3	Apply basic concept of chromatography and its application to Thin layer chromatography, high performance liquid chromatography, gel permeation chromatography (GPC), gas chromatography used for separation analysis of mixtures of polymers and plastic products	**Apply**	**B.L-2**
CO4	Apply basic principle and working of all measuring instruments used for determination of number average molecular weight ,M_n and weight average molecular weight, M_w and molecular weight distribution of polymers.	**Analyze Evaluate**	**B.L-4**
CO5	Apply the various modern analytical techniques viz IR, FT-IR, NMR,UV, GC-MS etc. For the characterization of unknown polymers for their identification and the interpretation of the results.	**Apply Analyze Create**	**B.L-5**

Course Name: Plastic Processing -I
Course Code: TPP 504

The students will be able to:

	Course Outcomes	**Bloom's Taxonomy**	**Bloom's Level (B.L)**
CO1	Understand the role of rheology in plastic processing, construction features of extruder, effect of process parameters, type & design of screw, barrel and dies on the output of extruder. Also, application of transfer and compression molding for processing of thermoset plastics	**Understand Apply**	**B.L-1**
CO2	Select the design of the screw of extruder to suit the polymer to be extruded Select the die of extruder as per profile of product to extruded	**Apply Analyze**	**B. L-2**
CO3	Optimize the input processing parameters to obtain good quality and maximum output of the extruded products.	**Evaluate Create**	**B.L-5**
CO4	Identify and analyzing the defects in the extruded products and therbysuggesting suitable remedial action, analyzing the importance and effect of various process variables affecting the extruded product quality.	**Apply Analyze**	**B.L-3**
CO5	Explain the transfer and compression molding for processing of thermoset materials.	**Analyze Evaluate**	**B.L-4**

Course Name: Plastics Testing Techniques
Course Code: TPP 505

The students will be able to:

	Course Outcomes	**Bloom's Taxonomy**	**Bloom's Level (B.L)**
CO1	Demonstrate the knowledge of various National & International standards used for testing of various properties viz short term and mechanical, thermal ,optical, inflammability, permeability etc.	**Understand Apply**	**B.L-2**
CO2	Understand the various formula, test specimen requirements and basic concepts involved during testing of different properties of plastics materials.	**Understand**	**B.L-1**
CO3	Analyze the test data of various properties for certification plastics materials and products.	**Analyze Evaluate Create**	**B.L-5**
CO4	Select the appropriate National/ International standard for testing the required properties of plastic materials/products.	**Apply**	**B.L-2**
CO5	Analyze the factors affecting the results of testing. Demonstrate the knowledge of various National & International standards used for testing of various properties viz short term and mechanical, thermal ,optical, inflammability, permeability etc	**Analyze Evaluate**	**B.L-3**

Course Name: Plastic Product & Mold Design
Course Code: TPP 506

The students will be able to:

	Course Outcomes	Bloom's Taxonomy	Bloom's Level (B.L)
CO1	Understand the various concepts, factors and design criteria used in the design of various types of plastic products and injection molds and extrusion dies.	**Understand Apply**	**B.L-2**
CO2	Select the plastic materials based on end use applications of products	**Apply Analyze**	**B.L-3**
CO3	Design plastic products for different working conditions with geometrical and financial considerations	**Evaluate Create**	**B.L-4**
CO4	Design of injection molds, compression molds, transfer molds, blow molds and extrusion dies as per specifications	**Evaluate Create**	**B. L-5**
CO5	Design the specialized mold designs for various other applications in processing industries and also for creating new research areas using modeling.	**Create**	**B. L-5**

Course Name: Adhesives and Sealants
Course Code: TPP 601

The students will be able to:

	Course Outcomes	**Bloom's Taxonomy**	**Bloom's Level (B.L)**
CO1	Understand the basic concept of adhesion, adhesive joints, mechanism of adhesion process, principles of adhesive formulation , their production & evaluation techniques for different applications, surface preparation & treatment techniques for adhesion, properties and curing of different sealants, hot melt adhesives etc.	**Understand Apply**	B.L-2
CO2	Select suitable adhesive and joint design for specific applications.	**Apply Analyze**	B.L-2
CO3	Formulate and select production techniques for different adhesives for different applications like packaging ,automotive, aerospace etc.	**Evaluate Create**	B.L-5
CO4	Identify relevant surface preparation and treatment methodsuitable to a given adhesive	**Apply Analyze**	B.L-3
CO 5	Evaluate properties of various adhesives with respect to various substrates	**Evaluate**	B.L-4

Course Name: Polymer blends and Composites
Course Code: TPP-602

The students will be able to:

	Course Outcomes	Bloom's Taxonomy	Bloom's Level (B.L)
CO1	Understand basic concept of methods of polymer blending and compatibilization, properties, Characterization techniques , phase behavior of polymer blends	**Understand Apply**	B.L-1
CO2	Tailor made the properties of new polymer composite material by selecting the right choice of polymer matrix and reinforcement as per need of the requirements.	**Evaluate Create**	B.L-5
CO3	Learn different FRP Processing techniques used for production of FRP products.	**Understand Apply**	B.L-2
CO4	Select specific manufacturing techniques for various composite products then analyzing and identifying the property requirements of composites for various applications.	**Analyze Evaluate**	BL-3
CO 5	Evaluate various design parameters for designing of composite products as per specification their performance analysis using morphological and rheological property behavior.	**Analyze Evaluate**	BL-4

Course Name: Plastics Packaging Technology
Course Code: TPP-603

The students will be able to:

	Course Outcomes	**Bloom's Taxonomy**	**Bloom's Level (B.L)**
CO1	Understand various aspects of different types of plastic packaging like design, functions, manufacturing processes and equipments, their hazardous impact on environment etc.	**Understand Evaluate**	B.L-4
CO2	Identify type of packaging and plastic materials as per requirements.	**Understand Apply**	B.L-2
CO3	Understand the various processing techniques , sealing and printing methods for plastic packages	**Understand**	B.L-1
CO4	Design a package by selecting plastic material & manufacturing process as per specific application.	**Create Apply**	B.L-5
CO5	Evaluation of properties of various plastic materials to design and manufacture the package for required application.	**Evaluate**	B.L-5

Course Name: Additives and Compounding
Course Code: TPP 604

The students will be able to:

	Course Outcomes	**Bloom's Taxonomy**	**Bloom's Level (B.L)**
CO1	Understand the properties, mechanism of function and applications of various additives for plastic and rubber materials and Construction features and operation various mixing equipments used for their mixing(compounding)	**Understand Analyze**	B.L-1
CO2	Suggest a suitable additive based on the performance and property requirement of the targeted polymer	**Understand Apply**	B.L-2
CO3	Modify of the properties of rubber compounds by varying vulcanizing agents.	**Create**	B.L-5
CO4	Select appropriate mixing equipments for a given polymer and additives. .	**Apply Analyze**	B.L-3
CO 5	Analyze the properties of various additives and vulcanizing agents to produce a rubber of desired properties	**Analyze**	B.L-3

Course Name: Plastic Waste Management & Recycling
Course Code: TPP 605

The students will be able to:

	Course Outcomes	**Bloom's Taxonomy**	**Bloom's Level (B.L)**
CO1	Understand the various aspects of plastic wastes like types of plastic wastes, their separation & treatment techniques disposal process, recycling processes and their hazards impact of on environment.	**Understand Analyze**	B.L-3
CO2	Select suitable recycling method for various plastics and rubber waste.	**Apply Understand**	B.L-1
CO3	Familiarize with various policies and legislations related to environmental issues of plastics waste & their management.	**Understand**	B.L-1
CO4	Analyze the various recycling methods used for thermosets, thermoplastic and rubbers waste	**Analyze Apply**	B.L-2
CO 5	Identify and analyze the various forms of plastic wastes	**Apply**	B.L-2

Course Name: Plastics Processing - II
Course Code: TPP 606

The students will be able to:

	Course Outcomes	Bloom's Taxonomy	Bloom's Level (B.L)
CO1	Understand principle, construction features of processing equipments, controllable process parameters and theory of standard operation involved during processing of thermoplastic and thermoset materials. .	**Understand Apply**	**B.L-1**
CO2	Set the process with respect to materials: • Optimize the processing parameters based on the quality of the molded products. • Identify the defects in the products and suggesting suitable remedial action.	**Apply Analyze**	**B.L-2**
CO3	Analyze the importance and effect of various process variables affecting the product quality.	**Analyze**	**B.L-3**
CO4	Calculate the process output and cycle time for different process.	**Evaluate Analyze**	**B.L-4**
CO5	Analyze the appropriate processing technique to suit to produce desired product at optimum cost.	**Create Analyze Apply**	**B.L-5**

Course Name: Industrial Safety & Hazard Management

Course Code: TPP-701

The students will be able to:

	Course Outcomes	**Bloom's Taxonomy**	**Bloom's Level (B.L)**
CO1	Understand the regulation and legislation, government rules, risk management routines, emergency preparedness, disaster planning and management regulations and source models related to handling, transportation and storage of flammable liquids, gases, and toxic materials and wastes	**Understand Apply**	B.L-1
CO2	Understand the methods of hazard identification and preventive measures	**Understand Analyze**	B. L. -3
CO3	Identify the relief and its sizing methods and regulation and legislation.	**Understand**	B.L-1
CO4	Analyze the toxic substances and degree of toxicity, their entry routes into human system,	**Analyze Understand**	B.L-3
CO5	Prevention of losses, pressure relief release of hazardous materials from tanks, pipes through holes and cracks,	**Apply Analyze**	B.L-2

Course Name: Nylon Technology
Course Code: TPP-702

The students will be able to:

	Course Outcomes	Bloom's Taxonomy	Bloom's Level (B.L)
CO1	Understand various aspects of Nylon like Principle of polyamidation, synthesis, manufacturing, modification by blending/co-polymerization, physical, chemical thermal, electrical, mechanical properties, various processing techniques and applications.	**Understand Analyze**	B.L-1
CO2	Identify the manufacturing process for the development of nylons for specific applications.	**Understand Apply**	B.L-2
CO3	Analyze the various parameters employed in the melt processing of nylon.	**Analyze Evaluate**	B.L-4
CO4	Select appropriate processing technique as per the type of product to be produced	**Apply Analyse**	B.L-3
CO5	Evaluate the properties of nylon for various applications and to modify the basic nylon by blending with other polymer and/or by co-polymerization with another monomer to obtain desired properties.	**Evaluate Create**	B.L-5

Course Name: Fiber Manufacturing Technology
Course Code: TPP-703

The students will be able to:

	Course Outcomes	**Bloom's Taxonomy**	**Bloom's Level (B.L)**
CO1	Understand properties of natural and manmade fibers and role of various equipments, process parameters affecting the properties and structure of fiber involved during different types of spinning process (melt spinning, wet spinning, and dry spinning, dry jet wet spinning, dry solution spinning, and wet solution spinning) used for spinning of different types of thermoplastics.	**Understand Apply**	B.L-1
CO2	Select appropriate fiber spinning process technique as per type of polymer to be spun.	**Apply Analyze**	B.L-2
CO3	Analyze the effect of various spinning parameters onthe structure and properties of the fiber	**Analyze**	B.L-3
CO4	Remember the role of each equipment used during spinning process	**Analyze**	B.L-3
CO 5	Able to compare the characteristic features of melt spinning of PET, Polyamides, polypropylene	**Analyze Evaluate**	B.L-4

Course Name: Surface Coating Technology
Course Code: TPP801

The students will be able to:

	Course Outcomes	Bloom's Taxonomy	Bloom's Level (B.L)
CO1	Acquire knowledge about the Raw materials, manufacturing technology, quality control tests etc involved during the manufacture of surface coating materials such as paints, varnish, lacquer etc including their properties and applications.	**Understand Apply**	B.L-1
CO2	Analyze the various physical, chemical and electrical properties of various surface coating materials.	**Apply Analyze**	B.L-3
CO3	Identify specific method to synthesize a polymer for a new paint /varnish suitable to specific application.	**Apply Create**	B.L-5
CO4	Analyze various types of ingredients used for production of the paints/varnishes to obtain desirable properties.	**Analyze Evaluate**	B.L-4
CO5	Identify the relevant surface preparation method and application technique for a selected paint /varnish.	**Apply**	B.L-2

Course Name: Polyurethane Technology
Course Code: TPP-803

The students will be able to:

	Course Outcomes	**Bloom's Taxonomy**	**Bloom's Level (B.L)**
CO1	Understand basic chemistry and technology involved in the manufacture of various types of foams and polyurethane elastomers, their properties, applications, testing, characterization, impact on environment.	**Understand Apply**	B.L-1
CO2	Select proper combination of raw materials to produce desired foam as per specification.	**Apply Analyze**	B.L-3
CO3	Demonstrate the knowledge of Environment health and safety measures to be taken during handling and processing of polyurethanes	**Apply**	B.L-2
CO4	Able to analyze and characterize the polyurethanes in respect physical, chemical properties of polyurethanes.	**Analyze Evaluate**	B.L-4
CO 5	Remember the different types of processing techniques and equipments used for manufacturing of Polyurethane foams.	**Evaluate Create**	B.L-5

Course Name: Technology of Elastomers
Course Code: TPP-804

The students will be able to:

	Course Outcomes	Bloom's Taxonomy	Bloom's Level (B.L)
CO1	Understand sources, history, structure , properties , mastication, compounding, vulcanizing processes and production of different grades of natural rubber and its derivatives	**Understand Apply**	B.L-2
CO2	Understand the technology of manufacture of different types of synthetic rubbers and elastomers their properties, applications.	**Understand Create**	B.L-1
CO3	Select appropriate combination of ingredients as well manufacturing technology for manufacture natural/ synthetic rubber.	**Apply Analyze**	B.L-3
CO4	Select appropriate equipment and process for the conversion rubber into desired product as per requirement.	**Apply Create**	B.L-5
CO 5	Analyze the impact of various process parameters and types of ingredients on the quality of rubber to produced	**Analyze Evaluate Create**	B.L-4