SYLLABUS & CURRICULUM

DIPLOMA IN PLASTICS TECHNOLOGY (DPT)

Implemented from Academic Year: 2023-24

Academic Cell
Central Institute of Petrochemicals Engineering & Technology (CIPET)
(Department of Chemicals & Petrochemicals,
Ministry of Chemicals & Fertilizers, Govt. of India)
Head Office, Guindy, Chennai – 600 032
Tel. No.: 91-44-22254514 / 22254780
Email: academics@cipet.gov.in Web: www.cipet.gov.in

Diploma in Plastics Technology

Vision : To acquire excellence in the field of Plastics Engineering and meet the global challenges of industries.

Mission:

- Impart excellent Training in Plastics Field and produce best Diploma Plastics Technicians to cater the Manpower Needs of Plastics Industries.
- Best Hands-on-Practical Training for acquiring Technical, Operational and Maintenance skills required for Plastics industries.
- Indoctrinate Human values along with the Technical Training and mould the student with social, economical and moral values.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- PEO-01: Develop fundamental understanding of the basic and engineering sciences and develop analytical & technical skills required for plastics technologist.
- PEO-02: Develop in-depth core competency with live industrial shop-floor exposure in the field of quality plastics processing.
- PEO-03: Develop professionals with integrity and strong ethical values for sustainable society.
- PEO-04: Develop professional with ability of effective soft skills & learning ability for engineering management.

PROGRAMME OUTCOMES (POs)

1. **Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.
2. **Problem analysis:** Identify and analyse well-defined engineering problems using codified standard methods.
3. **Design/ development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
4. **Engineering Tools, Experimentation and Testing:** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.
5. **Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices.
6. **Project Management:** Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
7. **Life-long learning:** Ability to analyse individual needs and engage in updating in the context of technological changes.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1. An ability to understand the concepts of basic Plastic product Manufacturing processes and to apply them to various areas like Raw material modification, Processing, Quality assurance & Design of Product, Mould & Dies.

PSO2. An ability to solve complex problems of Plastic product Manufacturing, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions maintaining the quality inline to the Standards.

PSO3 An ability to develop social wisdom and environmental awareness along with ethical responsibility in a successful career and to sustain in real-world applications using optimal resources as an Entrepreneur.

Syllabus structure at a glance

Semester	Total Theory +Practical	Type of courses	Hours	Credits	Total Marks		
			L+T+P		Theory	Practical	Total
1	5+ 3= 8	Humanities & Social Science + Basic Science Courses + Engineering Science Course + One Audit Course (Environmental Science)	540	22	500	300	800
2	5+ 3= 8	Humanities & Social Science + Basic Science Courses + Engineering Science Course	540	22	500	300	800
3	5+ 3= 8	Program Core Courses + One Engineering Science Course	540	22	500	300	800
4	5+ 3= 8	Program Core Courses + One Program Elective Course + Report on Student Club Activities	540	22	500	300	800
5	5+ 3= 8	Program Core Courses + One Program Elective Course + One Open Elective Course + Report on Industrial Visits	540	22	500	300	800
6	Project Work	Project Work & In-plant Training in Industry	540	07	700		800
	Online Certification Course	One Online Certification Course of CIPET (Or) NPTEL	Min 30	03	100		
			Total	**120**	**2600**	**2200**	**4800**

DIPLOMA IN PLASTICS TECHNOLOGY

SEMESTER – I (18Weeks-15 Hours a Week)										
Course Code	**Subject**	**Core € / Elective €**	**Hours Per Week**			**Total Hours**	**Credits**	Marks		
			L	**T**	**P**			INT	EXT	TOTAL
Theory										
MP101	Communication English-I	C	2	1		54	03	40	60	100
MP102	Workshop Mathematics	C	2	1		54	03	40	60	100
MP103	Engineering Chemistry	C	2	1		54	03	40	60	100
MP104	Computer & Information Technology	C	2	1		54	03	40	60	100
MP105	Environmental Sciences	C	2	1		54	03	40	60	100
Total Hours (A)						**270**	**15**	**200**	**300**	**500**
Practical										
MPL 101	Engineering Chemistry Lab	C			3	54	1.5	50	50	100
MPL 102	Communication Lab	C			4	72	2	50	50	100
MPL 103	Computer Engineering LAB	C			7	126	3.5	50	50	100
	Library			1		18				
Total Hours (B)						**270**	**07**	**150**	**150**	**300**
Total Summary (A+B)						**540**	**22**	**350**	**450**	**800**

SEMESTER – II (18Weeks-15HoursaWeek)										
Course Code	**Subject**	**Core € / Elective €**	**Hours Per Week**			**Total Hours**	**Credits**	**Marks**		
			L	**T**	**P**			INT	EXT	TOTAL
Theory										
MP201	Communication English–II	C	2	1		54	03	40	60	100
MP202	Engineering Mathematics	C	2	1		54	03	40	60	100
MP203	Engineering Physics	C	2	1		54	03	40	60	100
MP204	Electrical & Electronics Engineering	C	2	1		54	03	40	60	100
MP205	Development of Life Skills	C	2	1		54	03	40	60	100
Total Hours (A)						**270**	**15**	**200**	**300**	**500**
Practical										
MPL201	Electrical & Electronics Engineering Lab	C	3		3	54	1.5	50	50	100
MPL202	Engineering Physics Lab	C	3		3	54	1.5	50	50	100
MPL203	Workshop Practice	C	8		8	144	04	50	50	100
	Library			1		18				
Total Hours (B)						**270**	**07**	**150**	**150**	**300**
Total Summary (A+B)						**540 Hours**	**22**	**350**	**450**	**800**

L – LECTURE T- TUTORIAL P – PRACTICAL

SEMESTER – III (18 weeks – 15 hours a week)											
Course Code	**Subject**	**Core € / Elective €**	**Hours Per Week**			**Total Hours**	**Credits**	**Marks**		
			L	**T**	**P**			INT	EXT	TOTAL
Theory										
MP301	Polymer Science & Engineering	C	2	1		54	03	40	60	100
MP302	Plastics Materials-I	C	2	1		54	03	40	60	100
MP303	Plastics Processing Technology-I	C	2	1		54	03	40	60	100
MP304	Engineering Drawing	C	2	1		54	03	40	60	100
MP305	Hydraulics & Pneumatics	C	2	1		54	03	40	60	100
					Total Hours (A)	**270**	**15**	**200**	**300**	**500**
Practical										
MPL301	Plastics Processing Lab-I	C			8	144	04	50	50	100
MPL302	Engineering Drawing Practice	C			3	54	1.5	50	50	100
MPL303	Utilities & Service Equipments Lab	C			3	54	1.5	50	50	100
	Library				1	18				
					Total Hours (B)	**270**	**07**	**150**	**150**	**300**
					Total Hours (A+B) Summary	**540**	**22**	**350**	**450**	**800**

SEMESTER – IV										
Course Code	**Subject**	**Core € / Elective €**	**Hours Per Week**			**Total Hours**	**Credits**	**Marks**		
			L	**T**	**P**			INT	EXT	TOTAL
Theory										
MP401	Plastics Materials-II	C	2	1		54	03	40	60	100
MP402	Plastics Testing-I	C	2	1		54	03	40	60	100
MP403	Plastics Product & Mould Design	C	2	1		54	03	40	60	100
MP404	Mould Manufacturing	C	2	1		54	03	40	60	100
	Elective – 1 – To be selected one of common subject									
MMT/MP 405 or MP 405 or MP 405	Industrial Management / Total Quality Management / Advanced Plastics Processing Techniques	C	2	1		54	03	40	60	100
					Total Hours (A)	**270**	**15**	**200**	**300**	**500**
Practical										
MPL 401	CAD Lab	C			6	108	3	50	50	100
MPL 402	Plastics Testing Lab-I	C			8	144	4	50	50	100
MPC 403	Report on Student Club Activities	-	Beyond Lecture / Tutorial Hours				2	-	100	100
	Library				1	18				
					Total Hours (B)	**270**	**09**	**100**	**200**	**300**
					Total Hours (A+B) Summary	**540**	**24**	**300**	**500**	**800**

SEMESTER –V										
Course Code	**Subject**	**Core € / Elective €**	**Hours Per Week**			**Total Hours**	**Credits**	**Marks**		
			L	**T**	**P**			INT	EXT	TOTAL
Theory										
MP501	Plastics Recycling & Waste Management	C	2	1		54	03	40	60	100
MP502	Plastics Processing Technology-II	C	2	1		54	03	40	60	100
MP503	Plastics Testing-II	C	2	1		54	03	40	60	100
	Elective – 2 – To be selected one of common subject									
MP 504	Maintenance of Plastics Processing &Testing Equipment	E2	2	1		54	03	40	60	100
MP 504	Secondary processing Techniques									
MP 504	Entrepreneurship Development									
	Open Elective –1 - To be selected one of common subject									
MP 505	Artificial Intelligence & Machine Learning	E3	2	1		54	03	40	60	100
MP 505	Project Management									
MP 505	Internet of Things									
		Total Hours (A)				**270**	**15**	**200**	**300**	**500**
Practical										
MPL 501	Plastics Processing Lab-II	C			8	144	03	50	50	100
MPL 502	Plastics Testing Lab–II	C			6	108	02	50	50	100
MPO507	Report on Industry Visits	-	Beyond Lecture / Tutorial Hours / Weekends				02		100	100
	Library					18				
		Total Hours (B)				**270**	**07**	**100**	**200**	**300**
		Total Hours Summary (A+B)				**540**	**22**	**300**	**500**	**800**

SEMESTER-VI

Course Code	Subject	Core / Elective	Hours per Week			Total Hours	Credits	Marks		
		C	L	T	P			INT	EXT	TOTAL
MPP (Project Work & In-plant Training in Industry)										
MPP 601	Project Work & In-plant Training in Industry 18 Weeks / 30 Hours per Week	C				540	07	300	400	700
MPP 602	Online Certification Course of CIPET / NPTEL	C				Min. 30	03	-	100	100
MP 603	Indian Constitution	Audit Course	2 Hours per Week				-			
Total							**10**	**800**		

L – Lecture T – Tutorial P – Practical

SEMESTER – I

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP101	Communication English-I	43	11		3

Course Objective
Able to read and comprehend English; and be able to communicate both orally and by writing in simple English
Learning Outcomes
Effective Verbal & Written Communication.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Understanding of parts of Speech, tenses.	10	• Formation of sentences. • Identify grammatical rules to form correct sentences. • Use correct sentence pattern in writing and speaking. • Enrich vocabulary. • State and identify various tenses to be used in a situation.
2.	Understanding of visual charts	10	• Types Of Visual Communication • Build A Presence With Visual Communication
3.	Read and interpret information correctly.	10	• Conciseness • Clarity • Tone • Active Voice • Grammar & Punctuation
4.	Write and read essay and letters for communication purpose	10	Rules for writing essays and Letters and Practice of the same
5.	Answering verbal questions, dialogues writing and note making	14	A) Enhancing the Answering skills to any verbal conversations during Interviews, General Conversations etc B) Paragraph writing Technical paragraph. Descriptive Narrative C) Dialogue Writing Greetings Development of dialogue Closing sentence
	Total Classes	**54**	

Text Book :

- English for Technical Communication,Aysha Viswamohan First Edition, McGraw Hill Education 28 May 2008
- English for Engineers, N P Sudharshana (Author), C Savitha (Author), Cambridge University Press (Contributor) 2018th Edition, Cambridge University Press 1 January 2018
- "The Advanced Learners dictionary of Current English" Oxford University Press (Author) New issue of 3 Revised, Oxford University Press1 January 2020
- "High school English Grammar and Composition" P.C. Wren (Author), H. Martin (Author)S Chand, 1 January 2007
- Vocabulary in Practice – Part 1 to 4, Pye (Author) Cambridge University Press, 13 November, 2003
- "Essential English Grammar", Raymond Murphy (Author)Second Edition, Cambridge University Press 12 January 2000

Reference :

- "Basic English Usage'', Michael Swan (Author) OUP Oxford Edition, 18 October, 1984
- "Communication Skills for Engineers", Muralikrishna and Sunita Mishra (Author) 2nd Edition, Pearson Education India 1 January 2011
- "Common Errors in English", M. Thomas (Author) Lotus Press Edition, 1 January, 2007
- "Learn Correct English", Kumar (Author)1 edition Pearson Education India, 1 June, 2005

Course Outcomes

- Understand basic grammar principles
- Students will be able to write effective letters for job applications and complaints.
- Student will be capable to prepare technical reports and graphs and develop reading comprehension.
- Student will be able successfully participating in informal conversations and various skilled environments will be able to communicate themselves in their profession.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	3	3	2	2	1	1	2	3	2	1
CO2	3	3	2	2	1	1	2	3	2	1
CO3	3	3	2	2	1	1	2	3	2	1
CO4	3	3	2	2	1	1	2	3	2	1

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 102	Workshop Mathematics	43	11		3

Course Objective
To train on Mathematical concepts which are applied for day-to-day workshop activities in Industry
Learning Outcomes
Able to apply Mathematical relations for the solutions of Workshop of any Industry.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Elementary Mathematics	06	Understanding of simple fraction, addition, subtraction, multiplication, percentage and quadratic equation
2.	Trigonometry	10	Find unknown angles in any triangles, trigonometric ratios of multiple angles (2A & 3A) and problem solving the expansions
3.		08	Can use Trigonometric ratio and its table. Sine & cosine rule, Solutions of triangle, compound angles and multiple angles – able to solve simple problems
4.	Binomial Theorem	08	Statement & Simple Problems of Binomial Theorem. General & Middle Terms of Binomial Expansion.
5.	Pair of Straight Lines	08	Understand pair of line passes through originising second degree equations – simple problems.
6.	Circles	08	Illustrate and name the parts of a circle, radius, diameter & circumference and using General equations of a Circle able to find centre, radius and equation of the circle.
7.	Mensuration	06	Area and Circumference of 2Dshapes with simple problems. Surface Areas & Volume of 3D shapes
	Total Classes	**54**	

Text Book::

- ITI Workshop Calculations, Santosh Chauhan (Author) Neelkanth Publishers Pvt. Ltd., 1 January, 2018
- Applied workshop calculations,W. A. J. Chapman (Author) 3rd Revised edition, Hodder & Stoughton Educational 1 September 1965

Reference Books:

- Workshop calculations, tables**,** F. Camm (Author) Read Books, 7 May, 2010
- Senior Workshop calculation, W A J Chapman Bharath-A28KED5E1JUIJA, 1 January, 1975

Course Outcomes:

- After completion of the course, student will be capable to solve simple fraction and quadratic equations and Mensuration
- Student will be capable to apply the binomial theorem.
- Student will be capable to derive the equation of a line and circle (in different form).
- Student will be capable to apply the value of trigonometric ratios and solve the problem related to standard angles, compound and multiple angles.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	3	3	2	2	1	1	2	3	2	1
CO2	3	3	2	2	1	1	2	3	2	1
CO3	3	3	2	2	1	1	2	3	2	1
CO4	3	3	2	2	1	1	2	3	2	1
C102	3	3	2	2	1	1	2	3	2	1

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 103	Engineering Chemistry	43	11		3

Course Objective
Upon completion of the course the student shall be able to understand the Concepts of Chemistry and the real-life applications.
Learning Outcomes
Overview of key concepts of Chemistry. To provide the students with a fundamental understanding of structure & bonding, organic chemistry, water chemistry, organic chemistry and fuels, Electro chemistry & basic concepts of thermodynamics

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Atomic Structure & Bonding	08	Basic concepts of atomic structure and chemical bonding (Covalent, Ionic, Hydrogen, Coordinate Bonds) and electronic configuration.
2.	Electrochemistry	16	Knowledge on acid, bases, solutions Conductors, insulators, electrolytes– electrolysis – Faraday‘s laws of electrolysis numerical problems – Galvanic cell – standard electrode potential – electrochemical series– emf and numerical problems on emf of a cell
3.	Water Chemistry	08	Introduction – soft and hard water–causes of hardness–types of hardness –disadvantages of hard water – degree of hardness (ppm) – softening methods – permutit process – ion exchange process– drinking water –Osmosis, Reverse Osmosis – Applications of Reverse osmosis
4.	Organic Chemistry	08	To provide an overview of preparation and identification of organic compounds.
5.	Fuels	06	Understand different types of fuels & its extractions. –characteristics of good fuel-composition and uses of gaseous fuels.
6.	Basic concepts of thermodynamics	08	Understand basic concepts and terms of thermodynamics, thermodynamic processes, Heat and work concept with expressions.
	Total Classes	**54**	

Text Book::

- Text book of Engineering Chemistry, Jain (Author)16th Edition, Dhanpat Rai Publishing Company 1 January 2015
- Text book of Organic Chemistry, Bahl Arun (Author), Bahl B.S. (Author)S Chand & Company, 1 January 2016

- Text book of Inorganic Chemistry , P.L. Soni (Author) Sultan Chand & Sons, 1 January, 2013

Reference Books:

- Essential topics in Physical Chemistry, Arun Bahl, B. S. Bahl, G. D. Tuli, S. Chand, New Delhi, 2008
- A Text book of engineering chemistry, Dr. Pooja Bhaga Eighth Edition, Khanna Publishers **1 January 1992**

Course Outcomes

- Student will be able to understand basic concepts of atomic structure, chemical bonding and electronic configuration.
- Student will be able to acquire the basic knowledge about water chemistry and able to identify acid & base.
- Student will be able to understand different types of fuels & methods of its extractions and basic concept of electrochemistry & its application
- Student will be capable understand the basic concepts of thermodynamics processes and able to identify the organic compounds.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	3	2	1	2	2	2	2	3	2	2
CO2	3	2	1	2	2	2	2	3	2	2
CO3	3	2	1	2	2	2	2	3	2	2
CO4	3	2	1	2	2	2	2	3	2	2

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 104	Computer & Information Technology	43	11		3

Course Objective
To inculcate the Basic Computer Operation and Preparing / Maintaining Documents through MS-office.
Learning Outcomes
Able to use the computer, understand basics of operations and parts operating systems and MS office. Able to make PowerPoint presentation and use Computer communication and internet for daily activities.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Introduction to Computer Systems	09	Describe different parts of computers & its operating systems
2.	Windows & Operating System	09	Understanding windows operating system & its functions. Knowledge on MS office.
3.	Application of computer	09	Application of computer & communication for technical Work
4.	Presentation Tool	09	Power point presentation making
5.	Application of the specified type of network connecting device	09	Learn about Computer communication like LAN,MAN, WAN & Bluetooth.
6.	Internet	09	World Wide Web-Introduction ,Internet, Intranet ,Cloud ,Websites ,Web Pages ,URL, Web Servers, basic setting of web browser history, extension ,default page ,default search engine, creating and retrieving bookmarks, use search engines effectively for searching the content Web services-e-Mail, Chat, Video Conferencing, e-Learning ,e- Shopping ,e-Reservation, e- Groups, Social-Networking
	Total Classes	**54**	

Text Book :

- Fundamentals of computers, V. Rajaraman (Author)Prentice Hall India Learning Private Limited, 30 October 2003
- Computer Fundament ,RS Salaria (Author) 1s^{t} **edition Khanna Book Publishing**1 July 2017

Reference Books:

- Fundamentals of Computer Engineering**,** Rajaraman V (Author), Adabala N (Author) 6th Edition, Prentice Hall India Learning Private Limited 17 December 2014

Course Outcomes

- The student will be able to understand the components of computing systems
- The student will be able to explore alternate approaches to problem solving on computer communication
- The student will be able to recognize the technological trends of Computer Networking and Evaluate the challenges in building networks and solutions to those.
- The student will be able to realize the need of internet on day to day events

Course Mapping with Program Outcomes.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO 01**	**PSO 02**	**PSO 03**
CO1	3	3	3	2	2	3	3	1	2	2
CO2	3	3	1	1	1	1	3	1	2	1
CO3	3	3	3	2	2	2	3	1	1	2
CO4	2	2	2	1	1	2	3	2	2	2

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 105	Environmental Science	43	11		3

Course Objective
To understand the importance of Conserving / Protecting Environment for Sustainability
Learning Outcomes
Student will understand environmental aspects, which shall provide an insight into various environment related issues. Further student will reaize that the environmental studies are an interdisciplinary academic field that integrates physical, chemical and biological sciences, with the study of the environment.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Environment	09	Scope and importance of environmental science, effect human of activities on environment
2.	Ecosystem	09	Know the concept of eco system, structure and function
3.	Natural Resources	09	Awareness about natural resources, forest resources, exploitation, deforestation
4.		09	Awareness about water resources, food resources, mineral resources, land resources and energy resources.
5.	Pollution and its affects	09	Awareness about environmental pollution such as air, water, land, thermal, and water conservation, global warming, ozone layer depletion.
6.	Environmental Education	09	Knowledge about environmental protection acts and disaster management system types and policy.
	Total Classes	**54**	

Text Book::

- Introduction to environmental engineering and science, Kumar (Author)1st Edition, Pearson **1 January 2005**
- Environmental Science and engineering, Benny Joseph (Author)First Edition, McGraw Hill Education **29 November 2017**
- Environmental Science,G. Tyler Miller Jr. Scott Spoolman 14th Edition, Cengage Learning **1 January 2013**

Reference Books:

- Environmental studies from crisis to cure,R. Rajagopalan 3rd Edition, Oxford University Press **1 November 2015**
- A Textbook of Environmental Studies, Shashi Chawla (Author) McGraw Hill Education, 1st July, 2017

- Comprehensive Environmental Studies, V. Subramanian (Author) Alpha Science International Ltd, 30 January, 2015
- Innovation Strategies in Environmental Science,Charis M. Galanakis (Editor) Elsevier Science Publishing Co Inc, 21 August, 2019
- Innovation Strategies in Environmental Science, Charis M. Galanakis (Editor)1st Edition, Elsevier **20 August 2019**
- Environmental and Pollution Science, Mark L. Brusseau Professor (Author), Ian L. Pepper Professor (Author), Charles Gerba (Author) 3rd Edition, Academic Press **1 February 2019**

Course Outcomes

- The student will be able to identify environmental problems arising due to engineering and technological accomplishments and the science behind those problems.
- The students will be aware about natural resources
- The students will be aware about various types of environmental pollutions and their causes
- The students will have knowledge about various environmental protection acts and policies.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	1	0	0	1	3	1	3	1	1	3
CO2	1	0	0	1	3	2	3	1	1	3
CO3	1	1	1	2	3	2	3	1	1	3
CO4	1	1	1	1	3	2	3	1	1	3

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPL 101	Engineering Chemistry Lab			54	1.5
Course Objective						
Student will be capable of understanding the basic laboratory techniques and preparation of standard solutions, titration and volumetric analysis						
Learning Outcomes						
Student will be capable of understanding the basic laboratory techniques and preparation of standard solutions, titration and volumetric analysis						

Unit No.	Topics / Practical Outcomes	Lecture Hours	Learning Outcome
1.	Volumetric Analysis	5	Able to understand the volumetric concept
2.	Acidimetry – Alkalimetry	5	Able to understand the acidimetry
3.	Estimation of Hydrochloric acid	5	Able to understand the hydrochloric acid estimation
4.	Estimation of Sulphuric acid	4	Able to understand the sulphuric acid estimation
5.	Estimation of Sodium hydroxide given standard sodium carbonate solution & Hydrochloric acid as a link solution)	5	Able to estimate the Sodium Hydroxide Concentration
6.	Permanganometry - Estimation of potassium permanganate and Estimation of strength of Oxalic acid	5	Able to estimate the Potassium Permanganate
7.	EDTA Titration - Estimation of total hardness of water for the water sample	3	Able to Estimate the Total Hardness of the Water
8.	pH Determination - Determination of pH using pHmeter	10	Able to determine the pH of the water and solvents
9.	Preparation of Standard Solutions - Preparation of1N, 0.5N & 0.1N solution of sodium carbonates and Preparation of 1N Solution of oxalic acid.	12	Able to Prepare the Solutions Normality with different concentrations.
	Total Classes	**54**	

Course Outcomes

- Understand the basic laboratory techniques and preparation of standard solutions, titration and volumetric analysis
- The above Practical Outcomes also comprise of the following social skills/attitudes which are associated to the laboratory/field based experiences;
  a. Follow safety practices. b. Practice good housekeeping. c. Demonstrate working as a leader/a team member. d. Maintain tools and equipment. e. Follow ethical Practices.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO	3	3	3	2	3	1	0	3	2	1

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPL 102	Communication Lab			72	2

Course Objective

To be capable of communicating- listening, speaking, reading and writing in English-so as to use it as a tool to aid professional advancement

Learning Outcomes

capable of communicating- listening, speaking, reading and writing in English-so as to use it as a tool to aid professional advancement

Unit No.	Topics / Practical Outcomes	Lecture Hours	Learning Outcome
1.	LISTENING practical to develop comprehension	10	Able to learn the comprehension practice
2.	SPEAKING practical to learn voice modulation and situational conversation/role-playing	15	Able to improve communication English
3.	Learn READING and comprehension, and develop enriched vocabulary	15	Able to read and learn the vocabulary
4.	To learn art of writing both official and Business Correspondence	20	Able to learn and write the letters
5.	Learn how to participate in group discussions, mock interviews.	12	Able to improve the skill in group discussion
	Total Classes	**72**	

Course Outcomes

To be capable of communicating- listening, speaking, reading and writing in English-so as to use it as a tool to aid professional advancement.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO	0	2	1	0	0	3	3	1	1	3

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPL 103	Computer Engineering Lab			126	3.5

Course Objective
To impact the knowledge of various hardware components of a computer. To provide the skill of assembling the computer, formatting and installing windows operating system. To impact the knowledge and usage of various Microsoft tools such as Power Point ,Wordand Excel.
Learning Outcomes
To impact the knowledge and usage of various Microsoft tools such as Power Point, Word and Excel.

Unit No.	Topics / Practical Outcomes	Lecture Hours	Learning Outcomes
1.	Study of Computer Components	13	Able to Study of Computer Components
2.	Practice of Computer Booting Process in XP	11	Able to Practice of Computer Booting Process in XP
3.	Demonstration of Windows Environment	10	Able to understand Demonstration of Windows Environment
4.	Practice - using My Computer, Windows explorer	08	Able to Practice - using My Computer, Windows explorer
5.	Practice-using Control Panel	05	Able to Practice-using Control Panel
6.	Practice -My Network Places	04	Able to Practice -My Network Places
7.	Practice-CD and DVD Writing	04	Able to Practice-CD and DVD Writing
8.	Practice -Paint	02	Practice -Paint
9.	Installation of Windows XP by using NTFS File System.	10	Installation of Windows XP by using NTFS File System.
10.	Demonstration of Network	10	Able to Demonstration of Network
11.	Creating e-mail Account, Sending and Receiving e-mails	06	Able to understand Creating e-mail Account, Sending and Receiving e-mails
12.	Searching WebPage /Site using Search Engine:(eg.google.com, yahoo.com, altavista.com)	06	Able to understand Searching Web Page/ Site using Search Engine:(eg.google.com, yahoo.com,altavista.com)
13.	Exercise Based on MS-Word - Document Preparation, Printing Document, Mail Merge usage, Draw Table.	15	Exercise Based on MS-Word - Document Preparation, Printing Document, Mail Merge usage, Draw Table.
14.	Exercise Based on MS-Excel - Work Book Preparation, Printing Workbook, Data-base usage, Draw Charts.	15	Able to Exercise Based on MS-Excel - Work Book Preparation, Printing Work book, Data-base usage, Draw Charts.

15.	Exercise Based on Power Point - Creating Slide, Adding, Animations in Slide, Presentation.	07	Exercise Based on Power Point - Creating Slide, Adding, Animations in Slide, Presentation.
	Total Classes	126	

Course Outcomes:

- Identify various hardware components of a system.
- Apply the different tools and utilities of the operating system.
- Study to use the Internet safely, legally, and responsibly.
- Learn basic word processing, Spreadsheet and Presentation Graphics Software skills.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	1	2	1	2	2	3	3	3	3	3
CO2	3	2	1	2	1	2	2	1	2	2
CO3	2	2	1	1	2	3	3	2	1	2
CO4	2	2	1	1	3	2	2	1	1	2

SEMESTER-II

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 201	Communication English-II	43	11		3

Course Objective
To make student the necessity of affective Communication for Sustainability
Learning Outcomes
After the course, student can acquire the Skills of both Verbal & Drafting Communications required for personal and professional life.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Basics of vocabulary	06	Understand homophones, homonyms, articles and compound words, dialogue writing, question tags, vocabulary learning
2.	Sentences	06	Learn to write simple and complex sentences.
3.	Active and Passive voices	06	Understand Active and Passive voices
4.	Idioms and phrases	06	Usage of Idioms and phrases.
5.	Synonyms and Antonyms.	06	Knowledge of Synonyms and Antonyms.
6.	Letter Drafting	06	Write and read process chart and Technical letters.
7.	Communication Protocol	06	Ensure communicate with people in respectful form and manner in line with organizational protocol.
8.	Errors	06	Finding out common errors in a sentence & corrections.
9.	Forms & Reports	06	Knowledge on filling up of forms and writing technical report.
	Total Classes	**54**	

Text Book:

- English for Technical Communication, Aysha Viswamohan (Author1st Edition, McGraw Hill Education 28 May 2008
- English for Engineers, Foundation Books, Regional Institute (Author) Foundation Books1 December, 2008
- The Advanced Learner's Dictionary of Current English, A. S. Horn by (Editor) New issue of 3 Revised Oxford University Press, 1 Jan. 1963
- High School Wren and Martin English Grammar and Composition (Regular Edition) + Key to Wren and Martin English Grammar & Composition – COMBO, P. C. Wren (Author), H. Martin (Author) S. Chand& Company Pvt. Ltd, 1 January, 2022

- VOCABULARY IN PRACTICE 4, Glennis Pye (Author) Cambridge University Press, 24 April, 2003

Reference Books:

- Fully Revised International Edition by Michael Swan, **Michael Swan** (Author) Fourth – International, Oxford University Press
- COMMUNICATION SKILLS FOR ENGINEERS, **Muralikrishna and Sunita Mishra**2nd edition Pearson Education India 1 January 2011
- Common Errors in English, **M. Thomas** (Author)Lotus Press, January 1, 2007
- Learn Correct English: Grammar, Composition and Usage, **Kumar** (Author)1st edition Pearson Education India, 1 June 2005

Course Outcomes

- Students will be able in writing, reading and listening skills which qualify them to listen lectures and speak fluently in real environments.
- Will be able to Understand English speech sound system, stress and intonation
- Students will capable of learning vocabulary of wide-range by developing their skills.
- Enable students to express in a significant manner to different levels of people in educational and communal fields.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	3	3	2	2	1	1	2	3	2	1
CO2	3	3	2	2	1	1	2	3	2	1
CO3	3	3	2	2	1	1	2	3	2	1
CO4	3	3	2	2	1	1	2	3	2	1

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 202	Engineering Mathematics	43	11		3

Course Objective

To make student the necessity of affective Communication for Sustainability

Learning Outcomes

After the course, student can acquire the Skills of both Verbal & Drafting Communications required for personal and professional life.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Matrices	10	• Concept, notation, order, equality, types of matrices • Zero and identity matrix, transpose of a matrix, symmetric and skew symmetric matrices. • Operation on matrices: Addition and multiplication and multiplication with a scalar. Simple properties of addition, multiplication and scalar multiplication • Determinants upto 3X3 matrix • Minors, Co-factors and applications of determinants in finding the area of a triangle. • Adjoint and inverse of a square matrix
2.			Solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix and Cramer's rule.
3.	Complex Numbers	08	• Introduction. Algebra of Complex Numbers (Addition, Subtraction, Multiplication & Division). • Properties. • Modulus & Conjugate of Complex Numbers. • Cartesian representation of a complex number • Argand diagram • De Moivre's theorem – simple problems
4	Differential Calculus	10	• <u>Functions and Limits:</u> Concept of function and simple examples, Concept of limits without examples. • Derivatives: Concept of derivatives (Physical meaning of derivative) Rules of derivatives such as sum, product, quotient of functions, Derivative of composite function (chain Rule), implicit and parametric functions, Derivatives of inverse, logarithmic and exponential functions • Find the order and degree of given differential equation(s) • Form simple differential equations for given simple engineering problems
5.	Integration	10	<u>Indefinite Integration:</u> • Solve the given simple problem(s) based on rules of integration.

			• Obtain the given simple integral(s) using substitution method. • Integrate the simple functions using the integration by parts <u>Definite Integration:</u> • Solve the given simple problem(s) based on properties of definite integration • Apply the concept of definite integration to find the area under the curve(s)
6.	Vectors	06	• Vectors and scalars, magnitude and direction of a vector. • Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a Vector by a Scalar & Vector
7.	Probability	10	• Probability distribution: Discrete Probability distribution, continuous Probability distribution • Binomial distribution • Poisson‘s distribution • Normal distribution
	Total Classes	**54**	

Text Book::

- Applied Mathematics, For Polytechnic Colleges, P. Krishnamurthy, N. Thangasamy, K.V. Publication, 2009 Edition
- Engineering Mathematics - Dr. M.K.Venkatraman, National Publishing Co, Chennai.
- Mathematics VOl 1 Algebra and Trignometry. by M K Venkataraman, 1 January 2010

Reference Books:

- Engineering Mathematics - Vol. 2, S.Chand (G/L) & Company Ltd, 1 December 2006

Course Outcomes

- Explain Mathematics Principles for real life applications
- Student will be capable to identify different types of matrices and apply matrix algebra, determinants to solve the system of liner equations up to third order by Cramer’s rule.
- Student will be capable to understand the properties of the Cartesian representation of a complex number and able to apply De Moivre’s theorems.
- Student will be capable to apply techniques of calculus such as derivatives, integrals to solve problems involving product rule, successive differentiation, formation of differential equation up to second order, partial derivatives.
- Student will be capable to apply probability concepts to solve related simple problems

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	3	3	2	2	1	1	2	3	2	1
CO2	3	3	2	2	1	1	2	3	2	1
CO3	3	3	2	2	1	1	2	3	2	1
CO4	3	3	2	2	1	1	2	3	2	1
C102	3	3	2	2	1	1	2	3	2	1

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 203	Engineering Physics	43	11		3

Course Objective
This course is designed with fundamentals information to help the technologists apply the concepts and principles of Physics to solve Broad based Engineering Problems.
Learning Outcomes
Overview of key concepts of units, dynamics, force, motion, elasticity, surface tension temperature measurement and light

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Units & Dimensions	6	Understand different systems of units & dimensions, dimensional formula and derivation of expression of period of simple pendulum.
2.	Vectors	6	Knowledge on scalar & vector quantities.
3.	Forces & Motion	7	Ability to understand different types of Forces and motion including linear angular circular and parabolic motions.
4.	Elasticity	7	Definition of Elasticity –Definition of stress and strain -the units and dimensional formulae for stress and strain- Hooke‘s law & Youngs Modulus
5.	Viscosity & Surface Tension	7	Definition & Explanation of of Surface tension with reference to molecular theory - Definition of angle of contact - Definition of capillarity -The formula for surface tension based on capillarity - Explanation of concept of Viscosity - Examples for surface tension and Viscosity - Newton‘s formula for viscous force- Definition of co-efficient of viscosity- The effect of temperature on viscosity of liquids and gases - Poiseuille‘s equation for Co-efficient of viscosity
6.	Heat Transfer	7	Modes of heat transfer & their examples.
7.	Optics	7	To understand applications of optics using basic fundamentals of Physics.
8.	LASER	7	To understand working principle of a LASER, components and working of different laser system and their engineering applications.
	Total Classes	**54**	

Text Book::

- Engineering Physics, Gupta (Author) Dhanpat Rai, 1 January 2012
- "Engineering Physics", R. K. Gaur, S. L. Gupta, 8th Edition, Dhanpat Rai Publications, 2001
- Engineering Physics", Dhanam Publications, Edition, 2018

Reference Books:

- Engineering Physics-I, B.N. Sankar (Author), S.O. Pillai (Author) First Edition, New Age International Private Limited 1 January 2020
- A Textbook of Engineering Physics, Avadhanulu M.N. & Kshirsagar P.G. S.Chand, 1 December 2010
- Engineering Physics, D.K. Bhattacharya (Author), Poonam Tandon (Author) First Edition, Oxford University Press 19 May 2015
- Engineering Physics, Wiley Editorial (Author)1st Edition, Wiley 1 January 2013

Course Outcomes

- Students will be able to understand the different systems of units and knowledge of scalar and vector quantities.
- Students will be able to Realize the use of lasers as light sources for low and high energy applications
- The student will be able to know many modern devices and technologies based on optical fibers
- Student can also gain various material properties which are used in engineering applications and devices.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	3	3	2	1	1	1	2	3	2	2
CO2	3	3	2	1	1	1	1	2	2	1
CO3	3	3	2	1	1	2	1	3	2	1
CO4	3	3	2	1	1	2	1	3	2	1

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 204	Electrical and Electronics Engineering	43	11		3

Course Objective
Objective of the course is to apply principles of Electrical & Electronics and make them conversant with aspects of Plastics Manufacturing Industries.
Learning Outcomes
Overview of concept of AC & DC Current, DC generator & Motor, transformer, single phase capacitor, servo motor, and basic electronics and Logic Gates.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Concept of AC & DC Current	4	Describe the characteristics of AC& DC circuits.
2.	DC Generators & Motors	5	Describe how generators use magnetic induction.
3.		5	Describe the DC generator, DC Motor & its construction, principle of operation, types & its applications
4.		5	Distinguish between single and three-phase power.
5.	Transformers	5	Describe voltage transformers.
6.		5	Describe the basic types of transformer cores.
7.		5	Describe transformer connections
8.	Power Distribution Systems	5	Describe common power distribution systems.
9.		5	Describe the process of converting AC to DC.
10.	Safety	5	Describe ways to reduce electrical safety risks
11.	Basic electronics and Logic Gates	5	Describe semiconductor materials Describe the basic electronic & logic gates and their basic applications
	Total Classes	**54**	

Text Book (**2 to 3**):

- Basic Electrical, Electronics and Computer Engineering, R. Muthusubramanian (Author), SSalivahanan (Author), K.A.Muraleedharan (Author) McGraw Hill Education India Pvt Ltd, 7 October 1999
- BASIC ELECTRICAL ENGINEERING, T.N. Nagsarkar (Author), M.S. Sukhija (Author)3RD EDITION, 3rd Edition, Oxford University Press 20 May 2017
- Principles of Electronics, S Chand, 6 July 2018
- Fundamentals of Electrical Engineering and Electronics (LPSPE), B L Theraja (Author) S. Chand, B.L. Theraja 10 June 2006
- Fundamentals of Electrical and Electronics Engineering, Scitech Publications (India) Pvt Ltd, T. Thyagarajan (Author)3 August 2015

- Automation, Production Systems, and Computer-Integrated Manufacturing,Mikell P. Groover (Author) Fourth Edition, Pearson Education 22 July 2016

Reference Books:

- Raina K B_electrical Design, Mikell P. Groover (Author) 2 edition, New Age International Private Limited 22 July 2016
- Introduction to Programmable Logic Controllers, Gary Dunning (Author)2nd Edition, Delmar Cengage Learning 1 August 2001
- Electrical Technology (Vol.- I) by B.L Theraja& A.K Theraja

Course Outcomes

- The students shall develop an inherent understanding of the circuit analysis, basic concepts of electrical machines, house wiring and basics of electronics and be able to apply them in practical situation
- The students develop the knowledge of semiconductor physics and various devices and characteristics.
- The students have ability to acquire the knowledge on magnetic circuits and dc machines, transformers.
- The students have awareness of various equipment on electrical safety.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	3	3	2	1	1	1	2	3	2	2
CO2	3	3	2	1	1	1	1	2	2	1
CO3	3	3	2	1	1	2	1	3	2	1
CO4	3	3	2	1	1	2	1	3	2	1

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 205	Development of Life skills	43	11		3

Course Objective

To improve the personality of student and to develop the abilities and skills to perform at highest degree of quality as an individual as well as a member of core group or team. Enhancing capabilities in the field of searching, assimilating information, analyzing the given task, handling people effectively and solving challenging problems.

Learning Outcomes

- To enable the students to create an awareness on ethics and Human values.
- To appreciate the social and moral values of others.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Ethics & Morals	6	Study of personality development, ethics, moral &professional values and critical thinking.
2.	Management	8	Study of time management, stress & conflict management, problem solving and decision making.
3.	Motivation	8	Understanding of Theory of motivation, attitude and aptitude
4.	Health & Body Language	6	Knowing the importance of health and understanding body languages.
5.		6	Discussion of interview techniques and group discussion.
6.	Team Work	6	Importance and necessity of working in a team.
7.	Human Values	14	Universal Human Values: Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility, Exploring Human Consciousness & Natural Acceptance-Harmony in family, Human-to- Human Relationship, Exploring Feeling of Trust, Respect, Natural Acceptance of Human Values.
	Total Classes	**54**	

Text Book::

- Life Skills for Teens: The ultimate guide for Young Adults on how to manage money, cook, clean, find a job, make better decisions, and everything you need to be independent,Vivian Foster (Author) 31 August 2022
- Soft Skills for Everyone, Jeff Butterfield (Author) 1st Edition, Cengage Learning India 1 January 2011
- Introduction to Engineering Ethics, Mike Martin (Author), RolandSchinzinger (Author) 2nd Edition, McGraw-Hill Education **February 18, 2009**

Reference Books:

- A Foundation Course in Human Values and Professional Ethics, R.R. Gaur (Author), R. Sangal (Author), G.P. Bagaria (Author)Excel Books, 30 April 2010

Course Outcomes

- Will be able to Absorbing soft skills to excel in interpersonal skill which is essential for workplace.
- Capable of Exposure on awareness on professional ethical and human values.
- Will be able to to confer the ethical issues related to engineering and understand the responsibilities and rights in the society
- Will incur the necessity of Human Values in day to day life

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	1	0	0	1	3	1	3	1	1	3
CO2	1	0	0	1	3	2	3	1	1	3
CO3	1	1	1	2	3	2	3	1	1	3
CO4	1	1	1	1	3	2	3	1	1	3

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPL201	Electrical & Electronics Engineering Lab			54	1.5

Unit No.	Topics / Practical Outcomes	Lecture Hours	Learning Outcome
A-Electrical Engineering Lab:		04	
1.	Study of measuring instruments – Ammeter –Volt meter – Watt meter.		Able to Study of measuring instruments – Ammeter –Volt meter – Watt meter.
2.	Determination of resistance by Ohm's law.	03	Able to Determination of resistance by Ohm's law.
3.	Energy measurement in a single-phase circuit using lamp Load.	03	Able to understand Energy measurement in a single-phase circuit using lamp Load.
4.	Power measurement in a single phase circuit.	02	Able to understand Power measurement in a single phase circuit.
5.	Load test on a single phase transformer.	03	Able to understand Load test on a single phase transformer.
6.	Load test on a single phase induction motor.	03	Able to understand Load test on a single phase induction motor.
7.	Verification of series and parallel circuit.	03	Able to understand Verification of series and parallel circuit.
8.	Study of DC & AC machine starters.	06	Able to understand Study of DC & AC machine starters.
B - Electronics Engineering Lab			
1.	Characteristics of PN junction diode.	04	Able to understand Characteristics of PN junction diode.
2.	Characteristics of transistor.	03	Able to understand Characteristics of transistor.
3.	Construction of bridge rectifier.	03	Able to understand Construction of bridge rectifier.
4.	Verification of Logic gates.	02	Able to understand Verification of Logic gates.
5.	Characteristics of Photo Diode, LED and thermistor & Zener diode	03	Able to understand Characteristics of Photo Diode, LED and thermistor & Zener diode
6.	Measurement using CRO and Megger.	06	Able to understand Measurement using CRO and Megger.
7.	Study of microprocessor, microcontroller & drives.	06	Able to understand Study of microprocessor, microcontroller & drives.
	Total Classes	**54**	

Course Outcomes

- To be capable of Understanding and handling of electrical equipment and Capable of taking electronic measurements for basic maintenance of shop floor

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO	3	2	2	1	2	1	1	3	2	2

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPL202	Engineering Physics Lab			54	1.5

Unit No.	Topics / Practical Outcomes	Lecture Hours	Learning Outcome
1	Determination of thickness of a metal wire using screw gauge	04	Able to understand Determination of thickness of a metal wire using screw gauge
2	Determination of diameter of a cylindrical bar using vernier Caliper	04	Able to understand Determination of diameter of a cylindrical bar using vernier Caliper
3	Determination of time period of simple pendulum.	06	Able to understand Determination of time period of simple pendulum.
4	Experiment to verify Hooke's law	04	Able to understand Experiment to verify Hooke's law
5	Experiment to verify Lami's law	04	Able to understand Experiment to verify Lami's law
6	Determination of focal length of convex lens	05	Able to understand Determination of focal length of convex lens
7	Determination of focal length of concave lens	05	Able to understand Determination of focal length of concave lens
8	Determination of Young's modulus using non-uniform bending method	06	Able to understand Determination of Young's modulus using non-uniform bending method
9	Determination of moment of inertia andrigidity modulus using torsional pendulum	07	Able to understand Determination of moment of inertia and rigidity modulus using torsional pendulum
10	Determination of Thermal conductivity of bad conductor by Lee's disc method	06	Able to understand Determination of Thermal conductivity of bad conductor by Lee's disc method
11	Determination of Viscosity of given liquid by Stroke's method.	03	Able to understand Determination of Viscosity of given liquid by Stroke's method.
	Total Classes	**54**	

Course Outcomes

- To be capable of understanding of physics concepts applied in optics, thermal physics and properties of matter.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO	3	2	2	1	2	1	1	3	2	2

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPL203	Workshop Practice			144	4

Unit No.	Topics / Practical Outcomes	Lecture Hours	Learning Outcome
1	Familiarization of Workshop Tools & safety aspects	16	Able to understand the workshop tools
2	State the purpose / use of Hand tools, marking tools	14	Able to understand the workshop tools
3	Explain the purpose of Holding tools, cutting and striking tools	10	Able to understand the hand tools
4	Study and Practice on Measuring Instruments/Equipment	24	Able to understand the instruments
5	Filing and Fitting Practice Pedestal grinding -Safety precautions– Sharpening of cutting tools - single point, knife tools, form tools.	80	Able to understand the instruments
	Total Classes	**144**	

Course Outcomes

- The student will be capable of identifying and using Holding tools, cutting, striking tools, measuring instruments, /equipment's, pedestal grinding.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO	1	2	3	2	3	1	0	1	3	2

SEMESTER-III

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 301	Polymer Science & Engineering	43	11		3

Course Objective

Develops plastics diploma technocrat students in Polymerisation of Monomers. Polymerization reaction and its mechanism will help students to classify polymers for different industrial applications.

Learning Outcomes

To enable the trainee to understand mechanical behaviour of polymer materials and flow behaviour of polymer melts and the experimental techniques for measuring the rheological properties

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Basics of Polymer Science	09	Understanding of Basics of Polymer Science Monomers & its requirement- Broad Classifications of Polymers - Bonding in Polymers –Polymer structure–Isomerism, Molecular Weight and its Distribution. Thermal Transitions – Tg & Tm
2.	Basic Polymerisation Techniques	08	Understanding of basics of Polymerization -Chain growth– Step Growth Mechanism – Zieglar Natta Catalyst- Coordination Polymerization
3.	Other Polymerisation Techniques	06	Knowledge of different Polymerization techniques viz Bulk, Solution, Suspension, Emulsion Polymerisation, Melt Polycondensation, Solution Polycondensation.
4.	Structure - Property Relationship	04	Knowledge of Polymer Structure Relationship, Polymer solutions and solubility. State of Polymer – Crystalline, Amorphous
5.	Basics of Polymer Rheology	09	Understanding of basics of Polymer Rheology, Concept of Viscoelasticity
6.	Characterisation of Polymerisation	09	Identify and characterize Polymers, determine Molecular Weight & Melt Flow Characteristics
7.	Thermal Analysis	09	Study of Thermal Analysis -DSC, TGA and Dynamic Mechanical Analysis of polymers.
	Total Classes	**54**	

Text Book (**2 to 3**):

- Fundamentals of Polymers: Raw Materials to Finish Products, Niranjan Karak (Author) PHI, 1 December 2009
- Polymer Blends and Alloys: An Overview, R. P. Singh (Author) Asian Books Private Ltd, 1 December 2002
- Fundamentals of Polymer Engineering,Anil Kumar (Author), Rakesh K. Gupta (Author) Third Edition, 3rd Edition, CRC Press10 December 2018

Reference (1 to 2) :

- Polymer Science and Technology, Joel Fried (Author)3rd Edition, Pearson, 24 June 2014

Course Outcomes

- The students will be able to develop knowledge on polymerization techniques, chemical reaction of polymers and determine the molecular weight of the polymer.
- An ability to understand the influence of polymer structure in its properties and to determine solvents for polymer using solubility parameter.
- To understand and gain knowledge on the influence of rheology in polymer properties and handling rheological instruments.
- An ability to understand thermal analysis.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	3	2	1	1	1	0	1	3	2	1
CO2	3	2	1	1	1	0	1	3	2	1
CO3	3	2	1	3	3	0	1	3	2	1
CO4	3	2	1	3	3	0	1	3	2	1

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 302	Plastics Materials – I	43	11		3

Course Objective
To facilitate the students to learn about the general methods of preparation on different types of plastic materials. To study about the general properties, processing behaviour and applications of plastic materials. To understand the structure –property relation of different class of plastic materials.
Learning Outcomes
Study about the general properties, processing behaviour and applications of plastic materials. To understand the structure –property relation of different class of plastic materials.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Natural Plastics	10	Introduction to Natural Polymers / Natural Plastics - their sources, methods of manufacture, properties and applications
2.	Commodity Plastics	12	Knowledge of Commodity Plastics – OLEFINIC, STYRENIC, VINYL, ACRYLIC, CELLULOSICS POLYMERS-Method of Manufacture – General Characteristics & Properties – Processing Behavior and applications
3.	Engineering Plastics	20	Knowledge of Engineering Plastics (ABS, PS, PC, POLY AMIDES, POLY ACETAL, PET/PBT, PTFE, TPU) –Method of Manufacture – General Characteristics & Properties – Processing Behavior and applications
4.	Thermoset Materials	12	Thermoset Plastics (PF, UF, MF, Epoxy, Unsaturated Polyester) - Source of Raw Materials – Methods of Manufacture – General Characteristics & Properties – Processing Behaviour and Applications
	Total Classes	**54**	

Text Book (**2 to 3**):

- Plastics Material, J A Brydson (Author)7th Edition, Butterworth-Heinemann, 26 October 1999
- Handbook of Plastic Materials and Technology, 2 Volumes Set, Rubin Irvin I (Author)Wiley India, 1 January 2014
- Plastics Materials,J A Brydson (Author) 7th Edition, Butterworth-Heinemann **26 October 1999**

Reference (1 to 2) :

- Handbook of Plastic Materials and Technology,Irvin I. Rubin (Editor) Wiley–Blackwell, 21 June 1990

Course Outcomes:

- Students will learn about various basic methods of preparation of different plastic materials.
- Students will understand the properties of polymers based on the structure and various processing techniques suitable for particular end use applications
- Students have knowledge on thermoset plastic materials, processing techniques and its applications
- Students will be capable of understanding about thermoset materials and their properties.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	3	2	1	2	1	0	0	3	2	1
CO2	3	2	1	2	1	0	0	3	2	1
CO3	3	2	1	2	1	0	0	3	2	1
CO4	3	2	1	2	1	0	0	3	2	1

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 303	Plastics Processing Technology – I	43	11		3

Course Objective

To facilitate the students to understand the various processing techniques of plastic materials. To learn the fundamentals and basic processing of thermoplastics by injection molding, extrusion and blow molding. To develop the knowledge on automation system and use of robotics in molding process.

Learning Outcomes

To learn the fundamentals and basic processing of thermoplastics by injection molding, extrusion and blow molding. To develop the knowledge on automation system and use of robotics in molding process.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Introduction	06	Understand Basic Principles of Melt Processing of Thermoplastics – thermal behavior, Rheology, orientation, degradation, advantages and limitations
2.	Injection Moulding	18	Injection Moulding Process: Basic Process Principle - Types of Machines – Parts and its functions - Operation procedure - Clamping system - Types of Screw and their function -Heating System - Ejection system, Back Pressure, Types of Nozzles.
			Understanding of Process variables - Moulding cycle - Purging - Material recommendation - Shrinkage – Annealing –Dimensional Control - Moulding Record, Trouble Shooting aspects Microprocessor controlled Injection Moulding Machines
			Study of Injection moulding of Thermosets
			Understand basics of Automation and its application
			Identify Types of Injection Moulds –Feeding Systems including Gate Types, Runner, Sprue.
3	Extrusion Techniques	18	**a. Extrusion-** Principles - classification of extruders - types of screws - L/D ratio, compression ratio-back pressure, heating & cooling systems - breaker plate - screen pack & its functions - process variables and troubleshooting. **b. Operation & Principle of** • Pipe Extrusion • Profile Extrusion • Film Extrusion • CoExtrusion • Crosshead Extrusion. • Twin screw extruder • Vented Barrel Extruder

			c. Extrusion Accessories hopper loading devices - Drying equipments - Process, machinery - downstream equipments - dies for producing products
	Study of Blow Moulding process	12	Operation Principle – Process - Specification - Types - Processing parameters - Parison Programming - machine features - Cycle time –Clamping - Heating & cooling system - Mould venting – Fault Causes & Remedies
	Total Classes	**54**	

Text Book (**2 to 3**):

- Injection Molding: Theory and Practice,Irvin I. Rubin (Author) 1st Edition, Wiley India Pvt Ltd**10 December 2013**

- SPI Plastics Engineering Handbook of the Society of the Plastics Industry, Michael L. Berins (Editor)Softcover reprint of the original 1st ed. 1991, Springer**12 October 2012**

Reference (1 to 2) :

- Plastics Processing Data Handbook**,** D.V. Rosato (Editor)Springer, 31 January 1990
- Plastics: Materials and Processing, 2nd Edition, Pearson

Course Outcomes

- The students will gain knowledge of processing of plastic materials by injection molding, extrusion and blow molding and other techniques like transfer molding of thermoset plastics.
- The students will be able to handle automation system and robotics in molding process
- The students will be able to handle the extrusion machines.
- The students will be able to handle blow moldingequipments.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	1	2	2	3	2	2	3	2	2	3
CO2	2	3	1	2	3	1	2	3	1	2
CO3	2	1	2	1	1	3	1	1	2	1
CO4	1	2	1	2	1	1	3	3	1	2

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 304	Engineering Drawing	43	11		3

Course Objective

The student is expected to have the efficient drafting skill depending on the operational function in order to perform day to day activity. Provide neat structure of industrial drawing. To develop the knowledge about position of the component and its forms Interpretation of technical illustrations, Preparation of machine components and related parts

Learning Outcomes

The student will be able to perform free hand sketching of basic geometrical constructions and multiple views of objects, orthographic projection of lines and plane surfaces

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Introduction	03	Explanation of the scope and objective of Engineering Drawing
2.	Drawing Sheet & Layout	03	Study of drawing standard, size of drawing sheet, layout of drawing sheet.
3.	Aids of Drawing	04	Do the drawing with the help of drawing tools like, drawing Board, mini drafter, pencil.
4.	Dimensioning	02	Use scale and put dimension with the help of drawing tools.
5.	Geometrical constructions	06	General Method
6.	Projections(Orthographic and Isometric)	18	Projection of Points, Lines and Planes and solids
7.	Sections	08	Sectional Views – Introduction. Section Plane inclined to HP.
8.	Interpretations	04	Interpretation of fastening devices while drawing
9.	Basics of Assembly Drawing	06	Exposure the need of assembly and detailing of machine parts. Different types of couplings used for assembly and its uses.
	Total Classes	**54**	

Text Book (**2 to 3**):

- Charotar Publication Engineering Drawing, N.d.bhatt (Author)Fifty Third Edition 2014, Charotar Publishing House Pvt Ltd **1 January 2014**
- A Textbook Of Machine Drawing, Laxminarayan-Mathur, **3rd Edition,2017,**Publisher: Jain Brothers**1 January 2009**
- Engineering Graphics - S JulyesJaisingh second hand book online from Used Books Factory,
- Engineering Drawing – K.V. Natarajan.

Reference (1 to 2) :

- Engineering Drawing, 2e, Shah and Rana (Author)**2nd edition** Pearson Education India, **1 January 2009**
- Engineering Graphics for Degree, K. C. JOHN (Author) 1st Edition, PHI Learning, **13 April 2009**
- Engineering Drawing, Shah and Rana 2nd Edition, McGraw Hill Education, **1 January 2009**
- Engineering Drawing, P.S. Gill (Author) S.K. Kataria& Sons, 1 January 2013
- A Textbook of Engineering Drawing, T. Jeyapoovan (Author) 3rd Edition, S Chand Publishing **1 January 2010**

Course Outcomes:

- The students will be able to Use the drawing instruments effectively and able to dimension the given figures Knowledge to draw projections of solids and development of surfaces.
- Appreciate the usage of engineering curves in tracing the paths of simple machine components
- will be able to Understand the concept of projection and become Able to draw the basic views related to projections of Lines, Planes and solids
- will be able to Visualize and project isometric, perspective projections of simple solids and assembly drawing of machine parts..

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	3	3	3	3	2	2	2	3	2	1
CO2	3	3	3	2	2	2	2	2	2	1
CO3	3	2	3	3	2	2	2	3	2	1
CO4	3	3	3	2	2	2	2	2	2	1
C101	3	2.75	3	2.5	2	2	2	2.5	2	1

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP305	Hydraulics & Pneumatics	43	11		3

Course Objective
To provide student with knowledge on the application of fluid power in process, construction and manufacturing Industries. To provide students with an understanding of the fluids and components utilized in modern industrial fluid power system.
Learning Outcomes
Required learning out comes in cognitive, psychomotor and affective domain to demonstrate the Hydraulic and Pneumatic Systems used in Plastics Production Industries.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Basics of Hydraulics	10	Fluid-Concept and classification of fluid-Newton's law viscosity-Properties of fluid Density, Specific gravity, Specific Weight, Specific Volume-Dynamic Viscosity, Kinematic Viscosity, Surface tension, Capillarity, Vapour Pressure, Compressibility-Fluid pressure, Pressure head, Pressure intensity-Concept of absolute vacuum, gauge pressure, atmospheric Pressure - pressure,-Simple and differential manometers, Bourdon pressure gauge.
2.	Dynamics Of Fluids	12	Fluid flow-Types of fluid flows - Continuity equation-Bernoulli's theorem-Venturi meter Construction, principle of working, Coefficient of discharge, Discharge through venture meter. – Orifice meter-Pitottube – Construction, Principle of working,-hydraulic coefficients-Numerical on Bernoulli's theorem, venture meter, orifice meter
3.	Hydraulic Machines	12	Hydraulic turbines- Classification of turbine - Construction and working principle of Pelton wheel, Francis and Kaplanturbine. – Use of Penstock, Anchor Block, Surge tank and Drafttube. Concept of cavitations inturbines-Simple Numerical on Calculation of Discharge, Work done, Power, efficiency of Turbine (Exclude Francis turbine). Pumps-classification of pumps–construction and working of Centrifugal pump- Need for priming of centrifugal pump – multi stage centrifugal pump. Reciprocating pump-types-construction and working-Air Vessel-Slip-Simple Numerical on Calculation of discharge, Work done, Power, efficiency of pumps-construction and working Submersible pump

4.	Hydraulic System	10	Hydraulic systems – layout of oil hydraulic systems-. Advantages of hydraulic systems-Components of Hydraulic systems-Pumps-Vane pump, gear pump, screw pump,-Valves -working and symbols of Pressure control valves– pressure relief valve, Direction control valves– 3/2,5/2 valves, - Sequence valves.-Flow control valves-Actuators- Linear Actuators-Cylinders-single acting, double acting–Hydraulic motors-Accumulators-Types.
5.	Pneumatic and Electro Pneumatic Systems	10	Properties of air–Perfect Gas Laws– Compressor – Filters, Regulator, Lubricator, Muffler, Air control Valves, Quick Exhaust Valves, Pneumatic actuators
	Total Classes	54	

Text Book (2 to 3):

- Hydraulics and Pneumatics: A Technician's and Engineer's Guide,Andrew Parr (Author)3rd Edition, Butterworth-Heinemann **28 January 2011**

Reference (1 to 2) :

- Hydraulic and Pneumatic Power and Control. Design, Performance, Application, Frank D. Yeaple (Author)McGraw-Hill Book Company, January 1, 1966

Course Outcomes

CO1: Students can able to Draw symbols used in hydraulic systems and gain the Operation of different types of valves used in hydraulic systems

CO2: Students can acquire knowledge on Classification of the valves used in hydraulic systems.

CO3: Students can maintain different valves and auxiliaries and know the maintenance concepts of pumps and motors

CO4: Students can understand the pneumatic systems &Valves including their operation and Maintenance

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	0	1	1	1	2	3	3	1	1	3
CO2	1	1	1	2	2	3	3	1	1	2
CO3	1	2	2	1	2	3	3	2	2	2
CO4	2	2	1	1	1	2	3	2	2	2

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPL 301	Plastics Processing Lab - I			144	4

Course Objective
To develop the Students capability to operate the molding machines in industry
Learning Outcomes
Demonstration and practice on various plastic processing machine operation and its maintenance

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Introduction to Processing Shop Floor	10	Familiarization with basic concepts, job requirements & Basic related process
2	Safety	04	Safety precautions to be taken in Shop floor
3	Hand injection molding machine	08	Hand injection molding machine –parts and their function, Operating Principles, IRO
4		07	Produce molded products using different hand injection moulds.
5		10	Familiarization with Operation practice on Scrap
6	Semi-Automatic Injection Molding Machine	08	Knowledge of semi-automatic injection molding machine parts and their functions
7		16	Operate semi-automatic injection molding machine both pneumatic and hydraulic types
8		08	Demonstrate ability to determine cycle time and adjust process parameters
9	Automatic Injection Molding Machine	08	Knowledge of automatic injection molding machine parts and their functions
10		14	Operate Pneumatic& Hydraulic type of automatic Injection moulding machines, determine cycle-time
11	Film Extrusion	17	Blown film extrusion-Set up process and machine parameters and operate machine to produce different sizes of blown film.
12	Pipe Extrusion	18	Pipe extrusion - Set up process and machine parameters and operate machine to produce pipe/tube and also do troubleshooting.
13	Blow Moulding	16	Semi Automatic and Automatic Machine Setup and operate to produce good quality products.
	Total Classes	**144**	

Course Outcomes:

- Student will be able to operate the molding machines in industry

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO	3	2	1	2	1	2	3	1	2	3

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPL 302	Engineering Drawing Practice			54	1.5

Course Objective
To aim standard techniques of preparing and interpreting Engineering Drawing and understand 2D & 3D objects and models. To enable student to acquire to readily draw neat sketches often needed in “on-job situations”.
Learning Outcomes
Practical Exposure on Engineering drawing, study of assembly drawings

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Projections	02	Projection of points in different quadrants
2		06	Projection of straight lines parallel to one or both planes, parallel to one plane, perpendicular to other, inclined to one plane and parallel to other line inclined to both planes (in first quadrant) and finding the true length
3		04	Projection of planes and polygonal surface – parallel to one plane and perpendicular to other plane (in first quadrant)
4		06	Projection of simple solids for prism, pyramid, cylinder and cone when the axis is parallel to one plane and perpendicular to other plane in first quadrant
5	Sections	06	Sectioning of solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other, obtaining true shape of section
6	Lateral Surfaces	06	Development of lateral surfaces of simple and truncated solids- prisms, pyramids, cylinders and cones
7		06	Development of lateral surfaces of solids with cylindrical cut-outs, perpendicular to the axis.
8	Isometric Projections	10	Isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones
9	Assembly Drawing	08	Study of Simple Assembly Drawings
	Total Classes	**54**	

Course Outcomes:

- The student will be able to perform free hand sketching of basic geometrical constructions and multiple views of objects, orthographic projection of lines and plane surfaces
- Knowledge to draw projections of solids and development of surfaces.
- Ability to understand isometric and perspective sections of simple solids.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO	2	2	1	2	0	1	3	1	1	3

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPL 303	Utility & Service Equipment Lab			54	1.5

Course Objective

To build the skills of Maintenance of equipment including Hydraulic, Pneumatic and Electrical &Electronic accessories and systems.

Learning Outcomes

Understand the working, functions, operation and maintenance of service & Auxiliary Equipment in the Lab / shop Floor

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Basic Maintenance	06	Study of Air Compressor Elements, Safety Features, Drive Mechanism, Lubrication.
2.	Maintenance of Hydraulic Systems	06	Study of Hydraulic Pumps, Motors, Accumulators, Valves, Hydraulic Pressure Control, Flow Control Hydraulic Piping and Coupling –Safety and Trouble Shooting.
3.		04	Understand working of 4/2, 2/2 &4/3 directional control valve in Single & Double Acting Cylinders.
4.	Pneumatic Systems	03	Study of FRL unit and Air Dryer in Pneumatic System & Hopper Drier.
5.	Heat Exchangers	02	Study of heat exchangers in Moulding Machine.
6.	OilCirculators	02	Study of Mould Heating – Hot Oil Circulators.
7.	Chilling Units	02	Study of Chilling Plant / Cooling Tower.
8.	Maintenance of Electrical Accessories	03	Study of Electrical safety Measures & Demonstration about use of protective devices.
9.		02	Study and Usage of Various basic Electrical Tools & Instruments
10.		02	Study of Single Phase and Three Phase power supply. Identification of phase, Neutral and Earth pits
11.		03	Understand importance of three phase wiring and its effectiveness and its laying
12.		04	Identify common Electrical materials such as Wires, Cables, Switches, Fuses, Plugs, Connectors, Sockets
13.		01	Calculation of power and energy consumption.
14.	Protective Devices	02	Various types of protective devices –fuses, circuit breakers and Different types of switches, MCCB
15.	Study of Other Moulding Machine Accessories	02	Study of Flouorescent lamp & CFL
16.		02	Study of Servo Voltage Stabilizer
17.		02	Study of Half wave / Full wave rectifier.
18.		06	Study of different types of heater used in plastics processing Machinery using Voltmeter & Ammeter find out unknown wattage of heater
	Total Classes	54	

Course Outcomes:

- Students will be able to understand the working, functions, operation and maintenance of service and auxiliary equipment in shop floor

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO	2	3	1	2	3	1	2	2	3	1

SEMESTER-IV

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP401	Plastics Materials-II	43	11		3

Course Objective

To gain knowledge on general methods of preparation, properties and application of different speciality plastics. To know the concept of compatibility and study the structure and properties of important commercial blends. To understand the mechanism of degradation of polymers and stabilizing additives, to identify the various compounding methodologies for plastics materials and learn the maintenance of compounding machinery.

Learning Outcomes

To know the concept of compatibility and study the structure and properties of important commercial blends. To understand the mechanism of degradation of polymers and stabilizing additives, to identify the various compounding methodologies for plastics materials and learn the maintenance of compounding machinery.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Engineering Plastics	14	Knowledge of Specialty Plastics - PEEK, PPO, PSU, Poly Urethane, Poly Imides, PAI-Sources of raw material, Method of Manufacture, General Characteristics & Properties, Processing Behavior and Applications of Specialty Plastics.
2.	Polymer Blends & Alloys	10	Understanding of concept of Polymer Blends & Alloys, reasons for making polymer blends and alloy and their applications
3.	Polymer Composite	10	Understanding of concept of Polymer Composite–matrix materials, reinforcements, fillers and applications of composites in different fields.
4.	Additives	10	Knowledge of Additives and their properties for modifying the properties of plastics & Compounding processes used for incorporating the additives Study various Compounding Equipments.
5.	Compounding	10	Selection of Polymers and Compounding ingredients General objectives possibilities and limitations of mixing and Compounding Equipment.
	Total Classes	**54**	

Text Book:

- Plastics Materials, J A Brydson (Author) 7th Edition, Butterworth-Heinemann **26 October 1999**
- Handbook of Plastic Materials and Technology, 2 Volumes Set, Rubin IrvinI (Author) Wiley India, 1 January 2014

Reference (1 to 2) :

- Handbook of Plastic Materials and Technology,Irvin I. Rubin (Editor)Wiley–Blackwell, 21 June 1990
- Hand Book of Plastic Materials and Processing Technology, EIRI Board (Author)Engineers India Research Institute, 1 January 2009

Course Outcomes:

- Students will have knowledge about the structure and property of different speciality plastics.
- Students will know the importance of reinforcement in composites and the role of compatibiliser on the properties of different polymer blends.
- Students will have clear understanding of various types of additives for plastics and their merits and demerits.
- Student able to learn about various compounding methods used in the manufacturing of compounded thermoplastics and thermoset

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	2	1	0	3	2	0	2	2	1	3
CO2	3	1	2	3	1	0	1	3	1	2
CO3	2	2	1	3	2	1	1	2	2	1
CO4	3	1	2	3	2	1	1	3	1	2

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP402	Plastics Testing – I	43	11		3

Course Objective
To create the knowledge on different testing techniques and its basic concepts for evaluating the mechanical, thermal properties of plastic materials. To enable the students to identify and compare the properties of different plastics materials.
Learning Outcomes
To capable the students to identify and compare the properties of different plastics materials.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Concepts of Testing & Identification of Plastics	06	Understanding of Concepts of Testing-Specification and Standards, Test specimen preparation - Pre-conditioning and test atmosphere
2.	Identification	06	Knowledge of simple tests for Identification of plastics
3.	Basics of Characterization	10	Knowledge of simple techniques used for Material Characterization–Flow Behaviour, Density
4.	Mechanical Properties	16	Understanding of testing methods for determining short and long term Mechanical Properties
5.	Thermal Properties	16	Able to gain the Knowledge of short term test HDT, VST, and Long Term Heat Resistant Tests. Able to Understand Thermal Conductivity, Thermal Expansion and Brittleness Temperature.
	Total Classes	**54**	

Text Book (2 to 3):

- Text Book on Fundamentals of Plastics Testing - Prof. (Dr.) S.K..Nayak
- Handbook of Plastics Testing Technology (Society of Plastics Engineers Monographs),Vishu Shah (Author) 2nd Revised edition, Wiley–Blackwell **18 November 1998**

Reference (1 to 2) :

- Simple Methods for Identification of Plastics, Dietrich Braun (Author)4th Revised ed., Carl Hanser Verlag GmbH & Co **4 April 2013**

Course Outcomes:

- Students will gain knowledge on how the plastics materials are tested for its mechanical, thermal, and permanence properties.
- Students will be able to identify the plastic materials for some specified applications based on its property.
- Students will be able to understand the mechanical properties and its testing
- Students will be able to understand the Thermal properties and its testing

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	2	1	0	3	2	0	2	2	1	3
CO2	3	1	2	3	1	0	1	3	1	2
CO3	2	2	1	3	2	1	1	2	2	1
CO4	3	1	2	3	2	1	1	3	1	2

Course Type	Course Code	Name of Course	L	T	P	Credit
C	MP-403	Plastics Product and Mould Design	43	11		3

Course Objective
To know the concepts of product design and composite product design. To learn the design for threaded molds and insert molded products. To develop the knowledge in design concepts for various mold elements. Ability to know the basic design aspects related to Injection Mold, Compression Mold, Transfer Mold, Blow Mold and Extrusion Dies.
Learning Outcomes
Able to Understand the basics of plastics product and mold design involving the different processing techniques

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Basics of Product Design & Rapid prototyping	12	• Able to understand the basic concepts of Product Design and Prototype & Rapid prototype (RPT) - 3D Printing
2	Injection Mould Design and Compression Mould Design	15	• Able to understand Injection Mould Design elements, parting line, Runner, gate, ejection, mould cooling, mould alignment. • Knowledge on different Types of Injection Moulds. • Able to understand the basic concepts of Compression Mould Design and types of compression molds and ancillaries
3.	Transfer Mould Design and Extrusion Die design	15	• Able to understand the basic concepts of Transfer Mould Design and types of transfer molds and other ancillaries and related terminology. • Able to understand the basic concepts of Extrusion Die design and dies for different extrusion processes.
4.	Design of Thermoforming, Rotational and RIM moulds.	12	• Acquire the basic knowledge of design of Thermoforming, vacuum forming, rotational and RIM moulds.
	Total Classes	**54**	

Text Book (2 to 3):

- Injection Mould Design for Thermoplastics – Pye, R. G. W. **East-West Press Pvt. 1 January 2000**
- Plastics Product Design Engineering Handbook, Sidney Levy (Author), J.Harry Dubois (Author)Van Nostrand Reinhold Company, 1 July 1977

Reference (1 to 2) :

- Technical Manual on Plastics Mould Design S. K. Nayak (Author), P.C. Padhi (Author), Y. Hidayatullah (Author) **McGraw Hill Education 24 July 2012**

Course Outcomes

CO1: Able to understand the basic concepts of Product Design.

CO2: Able to acquire knowledge about various molds for different processing techniques.

CO3: Able to know the basic design aspects related to Injection Mold, Compression Mold, Transfer Mold, Blow Mold and Extrusion Dies.

CO4: Acquire the basic knowledge of design of Thermoforming, vacuum forming, rotational and RIM moulds

Mapping of course outcomes with program outcomes :-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	1	2	3	2	3	1	2	3	2	3
CO2	2	3	1	2	0	3	2	2	2	3
CO3	1	2	3	0	3	2	1	1	3	2
CO4	2	3	1	1	2	3	2	2	2	3

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 404	Mould Manufacturing	43	11		3

Course Objective
Learning Outcomes
Knowledge on mold steel and different techniques used for cavity machining, Inspection and assembly of molds and polishing / Texturing the mold surfaces

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Mould Materials	12	Material selection for different molds – mold steels and non- ferrous materials
2.	Conventional Machining	14	Knowledge of Conventional Techniques - Procedure for manufacturing of moulds –Cutting Tools - Study of various machining operations, Manufacturing of various mould elements.
3.	CNC Machining	14	Knowledge of Mould Making Techniques - Special Machine & Tools- Electrical Discharge Machining (EDM), CNC machines for mould making, maintenance of molds.
4.	Mould Maintenance	14	Knowledge of Mould Maintenance – purpose - Specification sheets - History sheets – Instruction Manual- Factors for Physical Mould Life - Maintenance Frequency - Break Down Maintenance - Suggested Tools Preventive maintenance - Mould Removing, Cleaning and Storage.
	Total Classes	**54**	

Text Book (**2 to 3**):

- Mold-Making Handbook, Günter Mennig (Editor), K. Stoeckhert (Editor)3rd Edition, Hanser Publications **30 October 2013**
- Plastic Moulds and Dies,Laszlo Sors (Author) Van Nostrand Reinhold Company, Van Nostrand Reinhold Company **1 April 1981**
- A Textbook of Production Technology, P C Sharma (Author) S Chand, 1 December 2006

Reference (1 to 2) :

- Elements of Workshop Technology Vol-1, Choudhury H S K (Author) Media Promoters, 1 January 2008

Course Outcomes

- To identify the components of specific products and justify their material selection.
- To describe the advantage and disadvantage of different classes of manufacturing processes.
- To learn the manufacturing processes used to fabricate mold components. To know surface enhancement processes in advanced manufacturing and their application.
- To understand and identify the uses of various unconventional as well as conventional techniques for manufacturing of mould

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	3	2	2	3	2	2	3	3	2	2
CO2	2	3	2	2	3	3	2	2	3	2
CO3	3	2	3	2	3	2	2	3	2	2
CO4	3	3	3	2	3	2	3	3	3	2

Course Type	Course Code	Name of Course	L	T	P	Credit
Elective -1	MMT/MP-405	Industrial Management	43	11		3

Course Objective
Industrial management deals to impart training on plant layouts, production planning and control, work, motion study, etc., that has direct impact on key deliverables of industry.
Learning Outcomes
Awareness about management and its functions, human resources, develop awareness about quality and techniques to achieve quality through planning and adopting quality control measures, TQM. To have an idea about entrepreneurship and setting up of a Small Scale Industry.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Basic Principles	4	Principles of Management
2.	Functions of Management	6	Planning, Organizing, Staffing, Directing, Controlling, Decision making.
3.	Organization	8	Awareness about Organizational Structure, Line & Staff Organization, Leadership, Motivation and Communication.
4.	Human Resource Management	8	Awareness about Human Resource Management, Job description, Manpower Planning, Job Evaluation, Performance Appraisal, Training
5.	Quality Control	8	Understanding of concept and features of Quality Planning and Quality Control, Total Quality Control.
6.	ISO	6	Awareness about Quality Assurance and ISO9001
7.	Total Quality Management	8	Understanding of concept of TQM and Organizational Excellence and Techniques of TQM.
8.	Entrepreneur	6	Understanding of the concept of Entrepreneur & Entrepreneurship
	Total Classes	**54**	

Text Book (2 to 3):

- Industrial Engg & mngt, O. P. Khanna (Author)Dhanpat Rai Publications, 1 January 2018
- Personnel Management & Industrial Relations, R.S. Davar (Author), Tenth Edition, S Chand **1 January 2018**

- Entrepreneurship and Organizational Innovation (Management and Industrial Engineering),Carolina Machado (Editor), J. Paulo Davim (Editor) , 1st ed. 2020, Springer**1 August 2019**
- The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer (GENERAL FINANCE & INVESTING), Jeffrey K. Liker (Author) Reissue, McGraw Hill Education **16 January 2004**

Reference (1 to 2) :

- Industrial Engineering and Production Management, Mart and Telsang (Author)S Chand, 1 December 2006.

Course Outcomes

CO1: Able to understand the basic concepts of Management.

CO2: Able to understand about Management System & Organization

CO3: Able to know the basics of Quality Assurance & Quality Management

CO4: Acquire the basics of Entreprenuership

Mapping of course outcomes with program outcomes :-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	0	0	1	1	2	3	3	1	1	3
CO2	1	1	1	1	2	3	3	1	1	2
CO3	1	2	2	1	2	3	3	2	2	2
CO4	2	2	1	1	1	2	3	2	2	2

Course Type	Course Code	Name of Course	L	T	P	Credits
Elective -1	MP405	Total Quality Management	43	11		3

Course Objective
To introduce the main principles of business and social excellence, to generate knowledge and skills of students to use models and quality management methodology for the implementation of total quality management in any sphere of business and public sector
Learning Outcomes
The students will be able to apply Quality Management Systems and Concepts of Quality during his course of Service in industries.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Introduction to Quality	06	Definitions, Quality, Quality Control, Difference between Quality Control & inspection, Quality Assurance
2.	Concepts of Quality	04	Quality of design, Quality of conformance, Quality of performance
3.	Economics of Quality	06	Quality Costs, Economics of Quality, Quality Audit, Quality mindedness, Quality Circle-concept, objectives and function.
4.	TQM	06	Concept & Principles of TQM
5.	Customer Satisfaction	08	Customer Focus, Commitment by top Management, Continuous improvement (PDCA)
6.	Employee Empowerment	10	Importance of Employee Empowerment through Employee Training, Motivation. Concept of JIDOKA
7.	Process Improvement	06	DMAIC, Concept of six sigma
8.	Quality Management System	08	ISO 9000 series and other Standards-outstanding features Concept. Awareness on ISO 14000 Necessity of ISO Certification
	Total Classes	54	

Text Book (2 to 3):

- Industrial Engg&mngt, Dhanpat Rai Publications, O. P. Khanna (Author) **Dhanpat Rai Publication** 1 January 2018
- Personnel Management & Industrial Relations, by R.S. Davar (Author) 10th Edition, Tength Edition, S Chand **1 January 2018**
- Quality Management for Organizational Excellence: Introduction to Total Quality: United States Edition, David L. Goetsch (Author), Stanley Davis (Author) 6th Edition, Pearson **30 December 2008**

- Total Quality Management: Key Concepts and Case Studies, Butterworth-Heinemann Inc, D.R Kiran (Author) **Butterworth-Heinemann Inc** 1 November 2016

Course Outcomes

- Students gain knowledge on the basic management principles to become management (s) professional
- Students would be able to apply the tools and techniques of quality management to manufacturing and services processes.
- Students will be able to understand the concepts of TQM, concept of entrepreneur and entrepreneurship
- Students will be able to understand basic of tax, cost estimation and analysis of costing methods.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	1	1	1	1	2	3	3	1	1	3
CO2	1	1	1	1	2	3	3	1	1	2
CO3	1	2	2	1	2	3	3	2	2	2
CO4	2	2	1	1	1	2	3	2	2	2

Course Type	Course Code	Name of Course	L	T	P	Credits
Elective -1	MP405	Advanced Plastics Processing Techniques	43	11		3

Course Objective

To introduce the Advancements to the Conventional Plastics Processing Techniques

Learning Outcomes

Basic injection moulding get enhancement with the development of many advanced techniques such as microinjection, co-injection moulding. Blow moulded products get functionality with the development of Stretch blow molding and multi-layer blow molding.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Specialized Injection Moulding Processes	16	• Co-Injection Moulding – • Two Colour Injection Moulding • Gas Assisted injection Moulding • Water Assisted injection Moulding • Reaction Injection Moulding • Liquid Injection Moulding • Lost Core Moulding • Structural Foam Moulding Low Pressure foam, High pressure foam • Thin walled injection moulding • Injection moulding machines for Thermosets.
2.	Advanced Injection Moulding Machines and Auxiliary Equipments	12	• Microinjection moulding machines • Tie bar less Injection Moulding • All Electric Injection Moulding Machines • Auxiliary Equipment- Automated Conveyor system, Automatic Material loading, High Speed Side or Top Entry Robotics
3.	Advanced BlowMoulding Processes	14	• Extrusion Stretch Blow Moulding • Injection Stretch Blow Moulding • Forced Extrusion Blow Moulding • Accumulator Blow Moulding • Multi-layer Blow Moulding.
4.	Advanced Extrusion Processes	12	• Construction and working of extrusion for co-extruded products and die. • Construction and working of extrusion for Ribbed pipes • Construction and working of extrusion for corrugated pipes • Construction and working of extrusion for Profiles
	Total Classes	54	

Text Book (2 to 3):

- Plastics Engineering Handbook Of The Society Of The Plastics Industry, M. Berins 5th ed. 1994, Springer **31 August 1991**
- Plastics: Materials and Processing by A. Brent Strong (3rd Edition), 3rd Edition, Pearson **6 June 2000**
- Handbook of Plastic Processes, Charles A. Harper, **1st edition** Publisher **Wiley-Interscience 22 August 2006**

References :

- Extrusion: The Definitive Processing Guide and Handbook (Plastics Design Library), by Harold F. Giles Jr (Author), John R. Wagner, Jr. (Author) **1st edition William Andrew 31 December 2004**
- Blow Molding Handbook: Technology, Performance, Markets, Economics: The Complete Blow Molding Operation (Hanser Publishers), by A. Rosato C. Dominick V. Alberghini (Author) **Oxford University Press 1 January 1989**

Course Outcomes

- Operate specialized injection moulding machine for given application.
- Set the processing parameters for advanced injection moulding machines.
- Manufacture a plastic product with advanced blow moulding process.
- Operate advanced extrusion process for manufacturing plastic products

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	1	1	1	1	2	3	3	1	1	3
CO2	1	1	1	1	2	3	3	1	1	2
CO3	1	2	2	1	2	3	3	2	2	2
CO4	2	2	1	1	1	2	3	2	2	2

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPL 401	CAD Lab			108	3

Course Objective
Students will be capable to design the moulds by using the computer aided design software.
Learning Outcomes
The students will be able to design the moulds using CAD software

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Hand Injection Mould Design	14	Able to Understanding of hand injection Mould.
2	Design of Mould Elements / Standard Mould Base	20	Able to Understanding of Mould Elements and Standard Mould Base.
3	Single Impression Two Plate Mould	16	Able to Understanding of Single Impression Two Plate Mould.
4	Multi-impression Two Plate Mould	16	Able Understanding of Multi-impression Two Plate Mould.
5	Three Plate Mould (Multi-impression)	16	Able to Understanding of Three Plate Mould.
6	Split Mould Design	16	Able to Understanding of Split Mould Design.
7	Mould Design for Internal Undercuts	10	Able to Understanding of Mould Design for Internal Undercuts.
	Total Classes	**108**	

Text Book:

Course Outcomes:
Students will be capable to design the moulds by using the computer aided design software.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO	3	3	3	3	1	0	2	2	1	3

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPL 402	Plastics Testing Lab-I			144	4

Course Objective
To practice the knowledge on testing of plastic materials.
Learning Outcomes
The student will be able to identify the characteristic of plastics materials and products. They will be able to test chemical, mechanical, electrical, optical, thermal, and permanence properties of plastics with functional properties for different application.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Identification of Plastics by Simple methods Primary Tests – Elemental Analysis – Confirmation Tests	50	Understanding of Identification of Plastics by Simple methods
2	Determination of Density by Displacement Method	6	Understanding of Density by Displacement Method
3	Determination of Melting Point	6	Understanding of Melting Point
4	Determination of Filler Content	6	Understanding of Filler Content
5	Determination of Moisture Content	3	Understanding of Moisture Content
6	Determination of Volatile Content	3	Understanding of Volatile Content
7	Determination of Ash Content and Loss on Ignition	6	Understanding of Ash Content and Loss on Ignition
8	Specimen Preparation by Injection Moulding, Compression Moulding through Cutting & Punching	6	Understanding of Specimen Preparation by Injection Moulding, Compression Moulding
9	Determination of Tensile, Flexural & Compressive Properties	6	Understanding of Tensile, Flexural & Compressive Properties
10	Determination of Izod & Charpy Impact Test	4	Understanding of of Izod & Charpy Impact Test
11	Determination of Dart Impact Resistance of Plastics Films & Sheets	4	Understanding of Impact Resistance of Plastics Films & Sheets
12	Determination of Hardness (Shore -A & D, Rockwell Hardness, Barcol Hardness)	4	Understanding of Hardness
13	Determination of Melt Flow Index	4	Understanding of Melt Flow Index
14	Determination of Linear Shrinkage and Shrinkage on Transverse Direction	6	Understanding of Linear Shrinkage and Shrinkage on Transverse Direction

15	Determination of Carbon Black Content and Dispersion	6	Understanding of Carbon Black Content and Dispersion
16	Determination of Dilute Solution Viscosity	6	Understanding of Dilute Solution Viscosity
17	Determination of K-value for PVC resin	6	Understanding of K-value for PVC resin
18	Determination of HDT & VSP	4	Understanding of HDT & VSP
19	Determination of Dielectric Strength	4	Understanding of Dielectric Strength
20	Determination of Haze & Clarity	4	Understanding of Haze & Clarity
	Total Classes	**144**	

Text Book:

Course Outcomes:

The student will be able to identify the characteristic of plastics materials and products. They will be able to test chemical, mechanical, electrical, optical, thermal, and permanence properties of plastics with functional properties for different application.

Course Mapping with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO	3	2	1	2	3	0	1	3	2	1

Report to be submitted before the end of Fourth Semester

Course Type	Course Code	Name of course	No of Hours	Credits
C	MP 408	Participation in Student Club Activity	Beyond Lecture / Tutorial Hours	02

Students should take up any of the following CIPET clubs of their interest and actively organise / participate / execute the club activities in each semester. At the end of fourth semester students shall submit the report (semester wise) including photographs, achievements, certificates etc to the Particular Student Club Activity Head and Nodal Officer of CIPET Centre. Total No of marks for the activity is 100. Based on the performance, the committee comprising of respective Student Club Activity Head, Nodal Officer& Training Incharge of CIPET Centre will allot marks against total of 100.

Details of CIPET Clubs:

- National Service Scheme
- Entrepreneurship Development Cell
- Enviro Club (Nurture Nature)
- CIPET Music Club
- CIPET Debating Society & Quiz Club
- Citizen Consumer Club (Ccc)
- CIPET Club Of Performing Arts
- CIPET Photography Club
- Health and Wellness Club
- CIPET Readers Club

SEMESTER-V

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP501	Plastics Recycling & Waste Management	43	11		3

Course Objective
Student capable to gain the knowledge on various sources of plastics waste generation and the segregation methods for recycling the plastics and recycling codes of commodity. To learn about primary recycling techniques with examples.
Learning Outcomes
Student will be understand the concepts plastics waste generation and the segregation methods for recycling the plastics and recycling codes of commodity. To learn about primary recycling techniques.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Understanding of Plastics Waste	14	Able to understand the sources of waste collection, segregation, identification by simple methods Able to understand the techniques employed for its separation.
2.	Knowledge of Plastics Waste Management	14	Able to understand the Techniques of recycling and its types. Able to understand the use of plastics waste for energy recovery, road construction
3.	Knowledge of Machinery and Value addition	08	Able to understand the Process, Basic Mechanical recycling Plant. Able to understand Additives for improving quality of recycled products
4.	Exposure to Environmental issues	08	Able to understand the guidelines related with Plastics Waste Able to understand the rules of Legislation in India for Plastics waste and its recycling
5	Recycling of Textiles	10	Methods, Concepts and Procedure for Recycling of Textiles.
	Total Classes	**54**	

Text Book (2 to 3):

- Technical Manual on Plastics Processing–CIPET
- Plastic Waste Management Turning Challenges into Opportunities, Publisher: Bharti Publications

Reference (1 to 2) :

- Environmental Engineering and Management, by Dr. Suresh K. Dhameja S K Kataria and Sons, 1 January 2010

Course Outcomes

- The students will have an impact of plastic waste on environment
- Student able to understand the technologies available for recycling and reusing of both commercial and engineering plastics
- Student understand the machineries for recycling of plastic waste and its functions
- The students have an ability to familiarize with various policies and legislations related to environment issues of plastics

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	0	2	1	2	3	3	3	1	2	1
CO2	1	2	1	3	2	3	3	2	1	3
CO3	1	1	3	2	2	1	3	1	2	2
CO4	1	2	2	3	3	2	3	3	1	3

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 502	Plastics Processing Technology – II	43	11		3

Course Objective
To impart the knowledge of Operation & Maintenance of Rotational, Compression, Transfer Mouldings & thermoforming and inculcate the concepts of FRP, Secondary Plastics Processes &Introduction to Advanced Plastics Manufacturing Techniques.
Learning Outcomes
Overview of rotational molding, thermoforming, compression and transfer molding process. Basic understanding of automation and secondary processing techniques and exposure to advanced plastics processing techniques

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Rotational Moulding	10	Basic Principle - Material selection- Types of machines - Heating and cooling system, advantages and limitations, Process variables, defects and troubleshooting
2.	Thermo Forming	10	Basic Principle - Material selection- Types of machines - Heating and cooling system, advantages and limitations, Process variables, defects and troubleshooting
3.	Compression & Transfer Moulding	10	Basic Principle - Material selection- Types of machines - Heating and cooling system, advantages and limitations, Process variables, defects and troubleshooting
.	Automation	10	• Importance of Automation in Industries. • Use of Robots in part handling, Robotics used in high production moulding process. Automated Conveyor systems.
5.	Introduction to Advanced Techniques	10	• Gas Assisted and Water Assisted Injection Moulding • Reaction Injection Moulding • Able to Understanding of Two/Multi colour moulding • Co-injection moulding • Double wall Blow moulding • Thermoset injection moulding
6.	Basics of FRP	04	• Definition. Hand Lay up& Spray Lay up Processes. Types of Fibres & Resins.
	Total Classes	**54**	

Text Book:

- Technical Manual on Plastics Processing –CIPET
- Plastics: Materials and Processing**,** by A. Brent Strong (Author), 3rd Editiion, Pearson **June 16, 2005**

Reference (1 to 2) :

- Compression Moulding – Iyesaw, A.I.
- SPI Plastics Engineering Handbook of the Society of the Plastics Industry, Inc., Softcover reprint of the original, Michael L. Berins **,** 1st ed. , Springer, **12 October 2012**

Course Outcomes:

- The students will gain the knowledge of specific processing techniques
- The students will gain the knowledge of Fibre Reinforced Plastics.
- The students will gain the knowledge of Automation and Secondary Processes.
- The students will gain the knowledge of Advanced Plastics Processing.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	3	2	3	3	3	2	2	3	2	2
CO2	2	3	2	3	2	1	1	2	1	2
CO3	2	1	3	2	1	2	3	2	3	1
CO4	2	2	2	1	3	0	1	3	2	1

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MP 503	Plastics Testing – II	43	11		3

Course Objective

To develop knowledge about the conditioning of samples and sample preparation techniques for testing various properties of plastics materials. To facilitate the students to learn about the evaluation of thermal, electrical, optical and mechanical properties of plastics materials. To create knowledge about testing of plastics products as per the standards.

Learning Outcomes

To facilitate the students to learn about the evaluation of thermal, electrical, optical and mechanical properties of plastics materials. To create knowledge about testing of plastics products as per the standards.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Electrical Properties	08	Able to Understanding of Dielectric strength. Able to understand the Study of Dielectric constant and Dissipation factor Able to Understanding Insulation resistance, Volume and Surface resistivity, Arc resistance and Antistatic tests.
2.	Optical Properties	06	Able to understand the Study of Refractive index, Luminous transmittance, Clarity and Haze and Photo-elastic properties. Colour Measurements and Gloss.
3.	Chemical Properties	06	Able to gain the Knowledge of testing of Chemical Properties. Able to understand the Study of Immersion test, Stain Resistance of Plastics and Environmental Stress Cracking Resistance.
4.	Flammability	06	Able to understand the Flammability testing. Able to understand the Study of Ignition Properties, Oxygen Index Test, and Flammability of Cellular Plastics, Smoke Density Test and UL94 Flammability Test.
5.	Weathering Properties	06	Able to gain the Knowledge of tests conducted for Weathering of plastics. Able to understand the Study of environmental factors affecting plastics. Able to Understand the Accelerated weathering tests, outdoor weathering of plastics and Resistance of plastics to biological systems.
6.	Bio-degradability Testing	08	Able to Understand of Bio-degradability Testing. Able to understand the various Test methods and standards for bio-degradable plastics. Able to understand the Criteria used in evaluation of bio-degradable plastics. Able to understand the Study of Description of current test methods.
7	Testing of Textiles	06	Concepts of Testing of Textiles – Denier – Tex – Ends & Picks -Other tests viz. Breaking Strength, Tearing Strength, Bursting Strength, Pilling Propensity, Air Permeability, Abrasion Resistance.

8.	Product Testing	08	Exposure to Product Testing of PVC & HDPE Pipes Water Tanks Containers. Polythene Films Woven Sacks.
	Total Classes	**54**	

Text Book:

- Text Book on Fundamentals of Plastics Testing - Prof. (Dr.) S.K. Nayak
- Handbook of Plastics Testing Technology (Society of Plastics Engineers Monographs), by Vishu Shah, **2nd Revised edition Wiley–Blackwell 18 November 1998**

Reference (1 to 2) :

- IS 4985, IS 4984, IS 12701, IS 15410, IS 2508, IS 14887

Course Outcomes:

- Students will gain knowledge on how the plastics materials are tested for its Properties.
- Students will gain knowledge on how the plastics materials are tested for its Weathering.
- Students will gain knowledge about the biodegradable materials and its testing.
- Students will be able to performing the product testing on different plastics products.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	1	1	1	3	0	1	1	3	1	1
CO2	21	1	1	3	2	1	2	2	1	2
CO3	1	1	0	3	3	1	2	2	1	2
CO4	2	2	1	3	3	1	3	3	1	3

Course Type	Course Code	Name of Course	L	T	P	Credits
Elective – II	MP-504	Maintenance of Plastics Processing &Testing Equipments	43	11		3

Course Objective
To have a knowledge on various sources of plastics waste generation and the segregation methods for recycling the plastics and recycling codes of commodity. To learn about primary recycling techniques with examples.
Learning Outcomes
Awareness of importance of maintenance and its types. Basic knowledge of maintenance of electrical and mechanical –hydraulics and transmission -systems of equipment's on lab / shop-floor

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Importance and objectives of Maintenance and Safety Rules & Regulations for	12	Able to understanding of the Importance and Objectives of Maintenance. Able to understand the different types of Maintenance, Maintenance Planning Ability to understand awareness of safety rules and regulations
2.	Electrical Parameters & their study Basic Mechanical Equipment's	12	Able to understand the knowledge of basic electrical parameters –Repair, and maintenance of the electrical equipment's Able to understand the different types of motors, starters, Circuit Breakers, Limit Switches & Timers, Able to understand the Relays, Heaters, Temperature Controllers and Thermocouples.
3.	Knowledge of basic Mechanical elements and Hydraulics	15	Able to understand the Screw, Barrel, Non return valve and Thrust Bearing. Able to understand the Gear Boxes, Calendar roll, Mill roll – platens flatness & parallelism measurement , Moving parts maintenance Able to understand the Basic understanding of Hydraulics. Able to understand the different types of pumps, different types of Valves, Valve sequences, Valve counter balance.
4.	Hydraulic Motors and Transmission system	15	Able to gain the Knowledge of Hydraulic Motors, Hydraulic Actuators, Filters, Compressors, Oil seals, O - Rings – Central Lubrication System, Oil quality monitoring, filtration Able to gain Knowledge of Transmission system i.e. Gears, V-belts, Chains - PLC system used in plastics processing& Testing Machineries.
	Total Classes	**54**	

Text Book (2 to 3):

- Industrial Hydraulics Manual, Eaton Hydraulics Training, Center Training Vickers (Author), **Eaton Hydraulics Training ,1** November 1992
- Injection Molding Handbook, by Dominick V. Rosato (Author), Donald V. Rosato (Author), **Kluwer Academic Publishers , 30 November** 1985

Reference (1 to 2) :

- Practical Injection Molding (Plastics Engineering), Bernie A. Olmsted&Martin Davis, 1st Edition,CRC Press **14 March 2001**

Course Outcomes

1 The student will be able to learn the basic of maintenance, planning of maintenance along with role of maintenance in proper functioning of equipment available.
2 The student will be able to get familiar with electrical equipment and parameters related to repair and maintenance
3 The students will develop an ability to get familiarize with various mechanical elements and components involved in the proper working of an equipment.
4 The student will be able to learn the hydraulic and transmission system involved in the maintenance equipment

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	2	2	3	3	3	1	3	3	2	1
CO2	2	3	2	2	3	1	2	2	3	1
CO3	2	2	3	2	3	2	2	3	3	1
CO4	3	3	3	2	3	2	2	3	3	1

Course Type	Course Code	Name of Course	L	T	P	Credits
Elective – II	MP-504	Secondary Processing Techniques	43	11		3

Course Objective

To inculcate the knowledge on development of plastic products using appropriate specialized (secondary processes).

Learning Outcomes

Awareness of importance of maintenance and its types. Basic knowledge of maintenance of electrical and mechanical –hydraulics and transmission -systems of equipment's on lab / shop floor

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Calendering Processes	10	Introduction-RawMaterialSelectionAndTypesOfAdditives-MaterialAndMaterial Preparation (Premix, Blending, Gelation) -Roll Construction -Types Of Rolls – Cored And Drilled Rolls Types Of Calenders-a.Super imposed Calenders-b.Offset Calenders-c.Z Calenders Heating And Lubrication Systems For Calendar Rolls -Calendaring Process With Plant Layout – Start-Up AndShut-DownProcedure-TroubleShooting-PostCalendaringProcesses-CompareWithSheetExtrusion.–Applications,AdvantagesandDisadvantages
2.	Casting	10	Introduction, Casting Material And Additives, Casting Mold Materials, Casting Process, Applications, Advantages and Disadvantages
3.	Fibre Reinforced Plastics	12	Introduction-Material Selection Criteria - Introduction Of Various Resins Use In Composite - Fibers – Classification, Properties And Applications – Release Agents–Internal And External-Gel Coat Preparation And Its Application Molding Compounds a. DMC/BMC b. SMC c. TMC d.Prepegs Mould Materials - FRP Processes a. Hand Lay Up b.Spray Lay Up c. Vacuum & Pressure Bag d. Filament Winding e. Pultrusion f. Match Die Molding g. Resin Transfer Molding. Applications of FRP

4.	Vinyl Dispersion	10	Introduction - Resin Selection Criteria-Plastics Preparation Vinyl Dispersion Process a. Spread Coating b. Knife Coatingc. Roll Coating.Fabric Coating.Film Casting Molding Processa. Dip Coating and Dip Molding. b. Hot And ColdMoldingc. Slush Moldingd. Rotational Moldinge. Strand Coating Applications
5.	Foam Processes	12	Introduction - General Production Methods Blowing Agentsa. Physicalb. Chemical-Cellular Structure And PropertiesFlexibleAndRigidFoamofa.Polyurethane(PU)b.Poly-VinylChloride(PVC)c.Polystyrene(PS)d.Poly-ethylene(PE)e.Epoxyf.Siliconeg.UreaFormaldehyde(UF)Applications, Advantages and Disadvantages
	Total Classes	**54**	

Text Book:

- Technical Manual on Plastics Processing –CIPET by Allen & Baker**CBS 1 January 2004**
- Plastics: Materials and Processing, by A. Brent Strong (Author) 3rd Edition, Pearson**June16, 2005**

Reference (1 to 2) :

- SPI Plastics Engineering Handbook of the Society of the Plastics Industry, Inc, Soft cover reprint of the original by Michael L. Berink, 1st ed. 1991, Springer 1**2 October 2012**

Course Outcomes

1. The students will be able to Identify & Compare specialized fabrication techniques.
2. Students gains the knowledge of FRP and their applications
3. Students can select the suitable Secondary Plastics processing Techniques for production of articles.
4. Students acquires the acquitance with different Foam Processes.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	1	2	3	3	3	1	3	3	2	1
CO2	2	3	2	2	3	1	2	2	3	1
CO3	2	2	3	2	3	2	2	3	3	1
CO4	3	3	3	2	3	2	2	3	3	1

Course Type	Course Code	Name of Course	L	T	P	Credits
Elective – II	MP-504	Entrepreneurship Development	43	11		3

Course Objective

To inculcate the knowledge and concepts of establishing manufacturing, service, trading, marketing and consultancy enterprises pertaining to Plastics & Allied Sectors

Learning Outcomes

To Identify entrepreneurial traits, Identify the business opportunities and write a business Plan.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Scope & Concept of Entrepreneur-ship Development	08	ScopeofEntrepreneurshipinlocalandglobalMarket.Stepsinsettingupofabusiness.-Traitsof successful entrepreneur
2.	Resource Planning	12	Selection of Product / Service, core competence, product life cycle, new product development process, mortality curve, creativity and innovation in product modification/development. Process selection: Technology life cycle, forms and cost of transformation, factors affecting process selection. Factors affecting selection of location for an industry. Importance of material handling and its relevance with facility location. Calculate capacity of plant and its relation with economics of scale. Including flexibility in capacity
3.	Managing critical resources	10	Managing finance: Sources of finance types, advantages and disadvantages, methods of cost control & importance, managing working capital. Materials Management: MRP, JIT Time management: art of managing time Information system: Developing suitable information systems.
4.	Project Planning	08	Preparation of business plan and techno-economic feasibility study-Breakeven point, return on investment and return on sales.
5.	Manage Enterprise	08	IdentifyingaUSP,developingamarketingplan-Developingsupplychain,planningfor initial orders
6	Risk Management	08	Planning for calculated risk taking, initiation with low cost projects – Integrated futuristic planning, angle investors and role of incubation centres.
	Total Classes	**54**	

Text Books:

- Entrepreneurial Instinct: How Everyone Has the Innate Ability to Start a Successful Small Business – by Monica Mehta - McGraw-Hill Education, New Delhi, 1**6 October** 2012
- Entrepreneurship Development – by S, Anil Kumar - **First Edition** , **newagepublishers25 June 2021**
- Entrepreneurial Development, by Np Srinivasan Cb Gupta (Author), Sultan Chand and Sons,Since, 1950, 1 January 2020

Reference (1 to 2) :

- Management And Entrepreneurship,by P Ramamurthy (Author), Reddy Sanjeev K Hudgikar (Author)First Edition, New Age Internationals **1 January 2020**

Course Outcomes

1. Students acquires importance of management skills and develops passion, creativity, initiative, independent decision making, calculated risk taking, assertiveness, persuasion, persistence, information seeking, commitment to work contract.
2. Students can able to Innovate& develop prototypes or ideas by applying theory into practice.
3. Students understand the requirements for setting up of service unit/industry.
4. Students can understand the schemes with inputs of Project Report &comprehensive business plan.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES:-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	2	2	3	3	3	1	3	3	2	1
CO2	2	3	2	2	3	1	2	2	3	1
CO3	2	2	3	2	3	2	2	3	3	1
CO4	3	3	3	2	3	2	2	3	3	1

Course Type	Course Code	Name of Course	L	T	P	Credits
Open Elective- 1	MP 505	Artificial Intelligence & Machine Learning	43	11		3

Course Objective
To introduce students to the domain of Artificial Intelligence.
Learning Outcomes
Student will have general idea about Artificial Intelligence, will be able to explore AI tools effectively.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Introduction to Artificial Intelligence	08	Overview and Historical Perspective, Turing test, Physical Symbol Systems and the scope of Symbolic AI, Agents.
2.	Heuristic Search& Randomized Search	12	Heuristic Search: Best First Search, Hill Climbing, Beam Search, Tabu Search Randomized Search: Simulated Annealing, Genetic Algorithms, Ant Colony Optimization
3.	Finding Optimal Paths Problem Decomposition Game Playing	16	Branch and Bound, A*, IDA*, Divide and Conquer approaches, Beam Stack Search Goal Trees, AO*, Rule Based Systems, Rete Net Minimax Algorithm, Alpha Beta Algorithm, SSS
4.	Planning and Constraint Satisfaction	10	Domains, Forward and Backward Search, Goal Stack Planning, Plan Space Planning, Graph plan, Constraint Propagation
5.	Logic and Inferences	08	Propositional Logic, First Order Logic, Soundness and Completeness, Forward and Backward chaining
	Total Classes	54	

Text Book:

- A First Course in Artificial Intelligence, by Deepak Khemani, **sixth edition** McGraw Hill Education (India) **1 July 2017**
- Heuristic Search: Theory and Applications, by Stefan Edelkamp (Author), Stefan Schrodl (Author), 1st Edition, Morgan Kaufmann Publishers In **28 July 2011**
- Artificial Intelligence by Elaine Rich and Kevin Knight, 2nd Edition, 19 September 2018

Reference (1 to 2) :

- Artificial Intelligence: A Modern Approach (Prentice Hall Series in Artificial Intelligence) Hardcover by Stuart Russell (Author), Peter Norvig (Author), **3rd edition Pearson** – 16 February 2010,
- https://nptel.ac.in/courses/106106126/
- A Classical Approach to Artificial Intelligence Paperback – Big Book, by Munesh Chandra Trivedi (Author),**2nd edition Khanna Book Publishing**- 1 January 2014

Course Outcomes:

- Students will gain knowledge on Symbols of Artificial Intelligence.
- Students will gain knowledge different types of Searches towards Artificial Intelligence.
- Students will gain knowledge on planning towards Artificial Intelligence Activities.
- Students will be able to gain knowledge on Logics and Interferences on Artificial Intelligence.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	1	1	1	3	0	1	1	3	1	1
CO2	21	1	1	3	2	1	2	2	1	2
CO3	1	1	0	3	3	1	2	2	1	2
CO4	2	2	1	3	3	1	3	3	1	3

Course Type	Course Code	Name of Course	L	T	P	Credits
Open Elective- 2	MP 505	Project Management	43	11		3

Course Objective

- To develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved.
- To develop an understanding of key project management skills and strategies.

Learning Outcomes

Student will acquire knowledge on Concepts of Preparation of Project including Budget Preparation, estimates and Projection.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Concept of a Project	06	Classification of projects- importance of project management- The project life cycle- establishing project priorities (scope-cost-time)project priority matrix- work break down structure.
2.	Capital budgeting process	10	Planning- Analysis-Selection-Financing-Implementation-Review. Generation and screening of project ideas- market and demand analysis- Demand forecasting techniques. Market planning and marketing research process-Technical Analysis
3.	Financial estimates and projections	12	Cost of projects-means of financing-estimates of sales and production-cost of production-working capital requirement and its financing-profitability projected cash flow statement and balance sheet. Break even analysis.
4.	Basic techniques in capital budgeting	12	Non discounting and discounting methods-payback period- Accounting rate of return-net present value-Benefit cost ratio-internal rate of return. Project risk. Social cost benefit analysis and economic rate of return. Non-financial justification of projects
5.	Project Administration	14	progress payments, expenditure planning, project scheduling and network planning, use of Critical Path Method (CPM), schedule of payments and physical progress, time-cost trade off. Concepts and uses of PERT cost as a function of time, Project Evaluation and Review Techniques/cost mechanisms. Determination of least cost duration. Post project evaluation. Introduction to various Project management software
	Total Classes	**54**	

Text Book:

- Projects: Planning, Analysis, Selection, Financing, Implementation and Review by Prasanna Chandra (Author),**Eighth Edition , McGraw Hill Education**, 15 May 2019 .
- Project Management: The Managerial Process | 6th Edition (SIE) by Erik Larson (Author), Clifford Gray (Author), **Sixth Edition McGraw Hill Education-** 1 July 2017
- Project Management Paperback by David Cleland (Author), Lewis Ireland (Author), 4 edition, Mcgraw-hill – 16 September 2002

Reference (1 to 2) :

- Textbook of Project Management Paperback by P Gopalakrishnan & V E Ramamoorthy (Author), **First Edition , Laxmi Publications** – 1 December 2022
- Project Management Paperback by Harvey Maylor (Author), **4th edition Pearson**– 27 September 2017

Course Outcomes:

- Understand the importance of projects and its phases & Analyze projects from marketing, operational and financial perspectives
- Evaluate projects based on discount and non-discount methods.
- Develop network diagrams for planning and execution of a given project.
- Apply crashing procedures for time and cost optimization.

Course Mapping with Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	1	1	1	2	0	3	1	2	1	1
CO2	2	1	3	2	2	1	2	2	1	2
CO3	1	2	1	3	3	1	2	2	1	2
CO4	1	2	2	3	3	1	3	3	1	3

Course Type	Course Code	Name of Course	L	T	P	Credits
Open Elective- 2	MP 505	Internet of Things	43	11		3

Course Objective
To study about the concepts of Internet of Things
Learning Outcomes
Student will be able to understand the application of Internet for data analysis.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Introduction to Internet of Things	14	Define the term “Internet of Things” • State the technological trends which have led to IoT. • Describe the impact of IoT on society
2.	Design consideration of IoT	16	•Enumerate and describe the components of an embedded system. • Describe the interactions of embedded systems with the physical world. • Name the core hardware components most commonly used in IoT devices.
3.	Interfacing by IoT devices	14	• Describe the interaction between software and hardware in an IoT device. • Explain the use of networking and basic networking hardware. • Describe the structure of the Internet.
4.	Data Science for IoT	10	•An Introduction to Data Analytics for IoT •Structured Versus Unstructured Data •Smart objects in IoT networks •Data in Motion Versus Data at Rest
	Total Classes	**54**	

Text Book:

- Internet of Things(old edition) by Raj Kamal (Author) First edition, **McGraw Hill Education** – 10 March 2017
- Internet of Things - A Hands-On by Arsheep Bahga (Author), Vijay Madisetti (Author) **First Edition Orient Blackswan Private Limited - New Delhi**– 1 January 2015.

Course Outcomes:

- Understand the importance of Internet and its application.
- Evaluate projects based on discount and non-discount methods.
- Develop network diagrams for planning and execution of a given project.
- Apply crashing procedures for time and cost optimization.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO1	1	2	1	2	1	3	1	2	1	1
CO2	2	1	3	2	2	1	2	1	2	2
CO3	1	2	1	0	3	1	2	2	1	2
CO4	3	2	2	3	3	1	2	3	2	3

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPL501	Plastics Processing Lab-II			144	3

Course Objective

Student will be capable to operate the thermoforming, calendaring, and rotational molding equipment. To learn the manufacturing of cellular plastics. To develop the basic knowledge on machining and joining of plastics by various adhesion and welding technique.

Learning Outcomes

Candidate will be able to learn the manufacturing of cellular plastics. To develop the basic knowledge on machining and joining of plastics by various adhesion and welding technique.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Understanding of Safety Precautions to be taken while handling Machine, Mould& Tools on shop floor	6	Student will be able to Understanding of Safety Precautions to be taken while handling Machine
2	Exposure to running of Automatic Injection Molding machine -Idle-Run Observation (IRO)	8	Student will be able to running of Automatic Injection Molding machine
3	Machines operation - Automatic Injection Molding machine - Practice, Process parameter setting	14	Student will be able to operate Automatic Injection Molding machine -Practice, Process parameter setting
4	Operation of Machine to produce components, observations of all parameters, cycle-time analysis, moulding faults analysis, causes and remedies.	22	Student will be able to make observations of all parameters, cycle-time analysis, moulding faults analysis, causes and remedies.
5	Understanding of Compression & Transfer Moulding-Semi Auto & Automatic -Parameter setting, clamping and safety factors	12	Student will be able to Understanding of Compression & Transfer Moulding-Semi Auto & Automatic
6	Operation-practice on different Compression & Transfer Moulds, Analysis of product defects & remedies, Analysis of cycle-time	14	Student will be able to understand different Compression & Transfer Moulds.

7	Study of different Thermoforming processes, type of moulds& materials used, Mounting & Clamping of plastic sheet, heating & vacuum system, cooling, trimming & finishing. Familiarization with m10achine controls	10	Student will be able to understand different Thermoforming processes, type of moulds& materials used, Mounting & Clamping of plastic.
8	Operation practice of Thermoforming processes Analysi1s of Cycle- time, processing-defects & remedies.	14	Student will be able to understand Thermoforming processes Analysis of Cycle-time.
9	Study of Rotational Moulding in IRO, sequence of operation, Raw materials used & loading, mould clamping practice	10	Student will be able to understand Study of Rotational Moulding in IRO, sequence of operation.
10	Operation practice to produce rotomoulded components, heating & cooling method adopted, Cycle-time analysis	16	Student will be able to understand heating & cooling method adopted, Cycle-time analysis
11	Understanding of FRP Process-Study of types of resins, Fibres & additives used in the process, Sequence of process operation in Hand lay-up process, Operation practice for hand lay-up process for producing FRP products, defects & analysis for the remedies	10	Student will be able to understand of FRP Process-Study of types of resins, Fibres& additives used in the process.
12	Study of ancillary Equipment -Hopper Dryer, Chiller, Mould Temperature Controller, Cooling Tower, Mixer	08	Student will be able to understand ancillary Equipment -Hopper Dryer, Chiller, Mould Temperature Controller, Cooling Tower, Mixer.
	Total Classes	**144**	

Course Outcomes

- Student will be capable to operate the thermoforming, calendaring, and rotational molding equipments. To learn the manufacturing of cellular plastics. To develop the basic knowledge on machining and joining of plastics by various adhesion and welding technique.

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO	3	2	1	2	3	0	1	3	2	1

Course Type	Course Code	Name of Course	L	T	P	Credits
	MPL502	Plastics Testing Lab-II			108	2

Course Objective
Student will be able to performing the testing on different plastic materials
Learning Outcomes
The students will be capable of define important properties of plastic and will be in the position to test the plastics for their functional properties used for different applications

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Product Testing as per BIS Standards	08	Able to understand the BIS standards.
2	Testing of PVC Pipes and Fittings	12	Able to understand the testing of PVC Pipes and fittings
3	Testing of HDPE Pipes and Fittings	12	Able to understand the
4	Testing of LDPE Films	08	Able to understand the Testing of LDPE Films
5	5 Testing of PET Containers for Drinking Water	08	Able to understand the Testing of PET Containers
6	Testing of PP and PC Feeding Bottle processes	10	Able to understand the Testing of PP and PC Feeding Bottle
7	Testing of Water Storage Tank And Testing of Foam	10	Able to understand the Testing of Water Storage Tank
8	Testing of FRP Products	08	Able to understand the Testing of FRP Products
9	Testing of Irrigation Laterals & Drippers	08	Able to understand the Testing of Irrigation Laterals & Drippers
10	Testing of Woven Sacks	08	Able to understand the Testing of Woven Sacks.
11	Migration Test to Stimulants	08	Able to understand the Migration Test to Stimulants
12	Testing of Vinyl Flooring	08	Able to understand the Testing of Vinyl Flooring
	Total Classes	**108**	

Course Outcomes

- The students will be capable of define important properties of plastic and will be in the position to test the plastics for their functional properties used for different applications

Course Mapping with Program Outcomes.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 01	PSO 02	PSO 03
CO	3	2	1	2	3	0	1	3	2	1

Course Type	Course Code	Name of course	No of Hours	Credits
	MPL 503	Industry Visits	Beyond Lecture / Tutorial Hours	02
Industry Visits- Report to be submitted before the end of Fifth Semester				

Students should complete minimum 4 Nos of Industrial Visits as per the details below;

- Plastics Manufacturing Industry (Injection Moulding Unit)
- Plastics Manufacturing Industry (Blow Moulding Unit)
- Plastics Manufacturing Industry (Extrusion Unit – Pipe / Film etc.)
- Plastics Manufacturing Industry (Compression Moulding unit)
- Plastics Manufacturing Industry (Rotational Moulding Unit)
- Plastics Manufacturing Industry (FRP Unit)
- Plastics Manufacturing Industry (Thermoforming Unit)
- Plastics Manufacturing Industry (Secondary based units viz. Printing, Box Strapping etc.)
- Plastics Raw Material Manufacturing Units
- Mould Manufacturing Units
- Master Batch Manufacturing Units
- Any relevant Units.

- Students shall visit minimum 4 industrial units among above mentioned, after completion of their 4th semester. All 4 visits shall complete by last academic working day of 5th semester. Students shall prepare the Documentary Industry Visit Report including:
    - ❖ Photographs preferably with Geotag.
    - ❖ Technical Infrastructure viz. Machinery / Equipment available in the industry with specifications, operational procedure, Raw Materials used, Products manufactured, Safety practices adopted, Implementation of any technological advancements and other Technical Information observed during the visit.
- Students shall visit preferably different types of units and the Documentary Report shall be submitted by the last working day of the 5th semester. Placement Incharge may coordinate with the industries & students for the visit.
- Committee Comprising the Training Incharge, Course Incharge, Placement Coordinator and any Senior Technical Employee shall be formed to assess the reports, conduct viva voce for assessing the output of Industrial Visits and accordingly assign the Marks as per prescribed scheme.

Scheme of Evaluation:

Only External Marks: 100

Number of Industries Covered	-	40 %
Evaluation of Documentary Report submitted by students including Photographs / Proof of Visits, Technical Details Incorporated in report viz. Machinery / Equipment available in the industry with specifications, operational procedure, Raw Materials used, Products manufactured, Safety practices adopted, Implementation of any technological advancements and other Technical Information observed	-	40 %
Viva voce	-	20 %

SEMESTER-VI

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPP601	Project Work and In-plant Training in Industry			540	07

Course Objective

- Student after undertaking the Technical Project will be able to analyse the technical inputs required to carry out project work and report the output in the form of Project Report.
- The student will be able to communicate efficiently and become a multi-skilled engineer through In-plant training and acquires good Technical Knowledge, management, leadership and entrepreneurship skills that will help to identify, formulate and model problems and find engineering solution based on a systems approach.

Learning Outcomes

- The student will be able to communicate efficiently and become a multi-skilled engineer with good technical knowledge, management, leadership and entrepreneurship skills that will help to identify, formulate and model problems and find engineering solution based on a systems approach.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Undertake a project. Project work shall be identified in collaboration with industry preferably. Projects related to : increasing productivity/ quality assurance/ estimation and economics of production/ repair and maintenance of plant and equipment/ identification of raw material thereby reducing the wastage/ suggesting substitutes of the polymer being used/ Any other related problems of interest for host industry. Undergo In-plant Training in a Plastics based industry.	540	The student will be able to communicate efficiently and become a multi-skilled engineer with good technical knowledge, management, leadership and entrepreneurship 4skills that will help to identify, formulate and model problems and find engineering solution based on a systems approach
	Total classes	540	

Course Outcomes

- The student will be able to communicate efficiently and become a multi-skilled engineer with good technical knowledge, management, leadership and entrepreneurship skills that will help to identify, formulate and model problems and find engineering solution based on a systems approach.

Course Mapping with Program Outcomes.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
	3	3	3	3	3	3	3	3	3	3

VI Semester

Project Work & In-plant Training in Industry

Scheme of Evaluation:

Internal Evaluation: 300 Marks

Monthly Attendance of In-plant Training	-	25 %
Monthly Progress Reports of In-plant Training	-	25 %
1st Review of Project Work – 6th Week of Semester	-	25 %
2nd Review of Project Work – 12th Week of Semester	-	25 %

Note: 1st& 2nd Review of Project Work shall be conducted by the officials of concerned CIPET centre with the Committee comprising of Project Guide, Course In-charge, Training In-charge & Head of the Department related to the Project Work.

ExternalEvaluation: 400 Marks

Project Report	-	25 %
Project Presentation	-	50 %
Project Work Viva voce	-	25 %

Course Type	Course Code	Name of Course	L	T	P	Credits
C	MPP 602	Online Certification Course of CIPET / NPTEL	Min 30	-	-	3

Course Objective
To undergo the specialised Online Courses of CIPET or NPTEL under MOOCS on Subject Related Technologies.
Learning Outcomes
Students in addition to acquiring the expertise of hands-on Industrial Training and project work, can gain the knowledge on recent technological advancements through online courses.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Online Certification Courses	Min 30	Can acquire the Technical Knowledge in Areas of interest along with the Project Work / Industrial Training
	Min. Duration in Hours	**Min 30**	

Scheme of Evaluation:

External Evaluation: 100 Marks

- As per the actual percentage of marks scored by the student in the final certification test of CIPET / NPTEL.

Course Type	Course Code	Name of Course	L	T	P	Credits
Audit Course	MP 604	Indian Constitution	2 hours per week			-

Unit No.	Topics to be Covered	No of Hours	Learning Outcome
1.	The Constitution – Introduction		• The History of the Making of the Indian Constitution • Preamble and the Basic Structure, and its interpretation • Fundamental Rights and Duties and their interpretation • State Policy Principles
2.	Union Government		• Structure of the Indian Union • President – Role and Power • Prime Minister and Council of Ministers • Lok Sabha and Rajya Sabha
3.	State Government		• Governor – Role and Power • Chief Minister and Council of Ministers • State Secretariat
4.	Local Administration		• District Administration • Municipal Corporation • Zila Panchayat
5.	Election Commission		• Role and Functioning • Chief Election Commissioner • State Election Commission
	Total Classes	2 hours per week	

Text Book:

- Politics And Ethics Of The Indian Constitution by Rajeev Bhargava (Author) – 19 August 2009
- Sahitya Bhawan The Constitution of India book in english medium by Fadia for IAS UPSC civil services and MA Political Science Paperback – 1 January 2021by B.L Fadia (Author), Dr. Kuldeep Fadia (Author), In house (Illustrator)
- Introduction To The Constitution Of India (24th Edition) Paperback – 1 January 2019 by D D Basu (Author)