SELF ASSESSMENT REPORT
SUBMITTED TO

NATIONAL BOARD OF ACCREDITATION
NBCC Place, 4th Floor East Tower, Bhisham Pitamah Marg,

Pragati Vihar New Delhi 110003

FOR THE ACCREDITATION OF

MASTER OF ENGINEERING

in

PLASTIC ENGINEERING

2023

DEPARTMENT OF GENERAL ENGINEERING
INSTITUTE OF CHEMICAL TECHNOLOGY
DEEMED UNIVERSITY UNDER SECTION 3 OF UGC ACT 1956 UNIVERSITY PAR EXCELLENCE.
ELITE STATUS AND CENTER OF EXCELLENCE – GOVT. OF MAHARASHTRA
NATHALAL PAREKH MARG, MATUNGA (E), MUMBAI 400 019, MAHARASHTRA

SAR Contents

PART A: Institutional Information

1. Name and Address of the Institution:

Institute of Chemical Technology, Mumbai
University under section 3 of UGC Act 1956 Estd.1933,
Elite Status and Centre of Excellence-Govt. of Maharashtra
ICT, Nathalal Parekh Marg, Matunga, Mumbai – 400019
Tel: +91-22-33612312, Fax: +91-22-33611020
Website: www.ictmumbai.edu.in

2. Name and Address of the Affiliating University, if applicable:

Institute of Chemical Technology, Mumbai
University under section 3 of UGC Act 1956 Estd.1933,
Elite Status and Centre of Excellence-Govt. of Maharashtra
ICT, Nathalal Parekh Marg, Matunga, Mumbai – 400019
Tel: +91-22-33612312, Fax: +91-22-33611020
Website: www.ictmumbai.edu.in

3. Year of establishment of the Institution: 1933

4. Type of the Institution:

Institute of National Importance	
University	
Deemed University	√
Autonomous	
Affiliated Institution	
Any other (Please specify)	

Note:
In case of Autonomous and Deemed University, mention the year of grant of status by the authority

5. Ownership Status:

Central Government	
Deemed University	√
Government Aided	
Self-financing	
Trust	
Society	
Section 25 company	
Any other (Please specify)	

Provide Details: Nil

6. Vision of the Institution:

We shall perennially strive to be a vibrant institute with continuously evolving curricula to brighten the future of the chemical, biological, materials and energy industries of the nation, and rank amongst the very best in the world through active participation and scholarship of our faculty, students and alumni. We shall be creators of sprouting knowledge and design cutting-edge technologies that will have the greatest impact on society and benefit mankind at large.

7. Mission of the Institution:

We shall generate and sustain an atmosphere conducive to germinating new knowledge at every available opportunity. The education we shall impart will enable our students to devise new solutions to meet the needs of all segments of society with regard to material and energy, while protecting the environment and conserving the natural resources. Our endeavors, while extending well beyond the confines of the classroom, will aim to enhance public welfare and our attempts to disseminate knowledge will spread to a greater multi- and cross-disciplinary platform to conduct research, discovery, technology development, service to industry and entrepreneurship, in consonance with India's aspirations to be a welfare state. We will team scientists and engineers with professionals in other disciplines to arrive at better solutions. We will provide all our students with a strong foundation to encourage them to be our ambassadors in the professional activities that they choose to undertake in service of society at national and international levels. Through our vision, we will serve the profession and society and strive to reach the summit as a team, and ultimately serve as role models to the younger generation.

8. Details of all the programs offered by the institution:

Sr. No.	Program Name	Name of the Department	Year of Start	Intake	Increase/ Decrease in intake if any	Year of Increase/ Decrease	AICTE Approval	Accreditation Status*
UNDERGRADUATE PROGRAMME (UG)								
1	B. Chemical Engineering	Chemical Engineering	1933	60	15	1995	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028
2	B.Tech - Dyestuff Technology	Dyestuff Technology	1944	16	2	1995	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2024-2025 i.e. upto 30-06-2025
3	B.Tech- Food Engineering and Technology	Food Engineering and Technology	1943	16	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028
4	B.Tech- Fibres and Textile Processing Technology	Fibres and Textile Processing Technology	1933	34	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2024-2025 i.e. upto 30-06-2025
5	B.Tech- Oils, Oleochemicals and Sufactant Technology	Oils, Oleochemicals and Sufactant Technology	1943	16	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028
6	B.Tech- Pharmaceuticals Chemistry and Technology	Pharmaceutical Sciences and Technology	1943	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028

7	B.Tech Polymer Engineering and Technology	Polymer and Surface Engineering	1946	8	8	1995	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028
8	B.Tech Surface Engineering & Technology	Polymer and Surface Engineering	1946	8	16	1995	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028
9	B. Pharmacy	Pharmaceutical Sciences and Technology	1959	18	30	1995	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028

POSTGRADUATE PROGRAMME (PG)

Sr. No.	Program Name	Name of the Department	Year of Start	Intake	Increase/ Decrease in intake, if any	Year of Increase/ Decrease	AICTE Approval	Accreditation Status*
1	M. Chemical Engineering	Chemical Engineering	1958	30	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028
2	M.Tech- Dyestuff Technology	Dyestuff Technology	1961	4	14	2019	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2024-2025 i.e. upto 30-06-2025
3	M.Tech.-Food Engineering &Technology	Food Engineering and Technology	1945	8	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2020-2021 to 2025-2026 i.e. upto 30-06-2026
4	M.Tech- Fibres and Textile Processing Technology	Fibres and Textile Processing Technology	1961	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028

5	M.Tech- Oils, Oleochemicals and Surfactant Technology	Oils, Oleochemicals and Surfactant Technology	1966	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2020-2021 to 2022-2023 i.e. upto 30-06-2023
6	M.Tech- Pharmaceuticals Sciences and Technology	Pharmaceutical Sciences and Technology	1961	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2020-2021 to 2025-2026 i.e. upto 30-06-2026
7	M.Tech- Polymer Engineering and Technology	Polymer and Surface Engineering	1966	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028
8	M.Tech- Surface Engineering & Technology	Polymer and Surface Engineering	1966	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028
9	M.Tech- Food Biotechnology	Food Engineering and Technology	1966	2	8	2009	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028
10	M.Tech- Bioprocess Technology	DBT-ICT Center of Biosciences	1994	30	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2020-2021 to 2022-2023 i.e. upto 30-06-2023
11	M.Tech- Perfumery and Flavor Technology	Dyestuff Technology	1992	5	13	2017	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028
12	M.Tech. Green Technology	Green Technology	2010	30	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2022-2023 to 2027-2028 i.e. upto 30-06-2028
13	M. Tech. Pharmaceutical Biotechnology	Pharmaceutical Sciences and Technology	2017	15	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	N.A.

14	M.E. (Plastic Engineering)	General Engineering	1972	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	2020-2021 to 2022-2023 i.e. upto 30-06-2023
15	M.Sc. (Chemistry)	Chemistry	2010	20	N.A.	N.A.	N.A.	N.A.
16	M.Sc. (Textile Chemistry)	Fibres and Textile Processing Technology	2010	20	N.A.	N.A.	N.A.	N.A.
17	M.Sc. (Engineering Mathematics)	Mathematics	2012	20	N.A.	N.A.	N.A.	N.A.
18	M.Sc. (Physics)	Physics	2014	20	N.A.	N.A.	N.A.	N.A.
19	M. Pharmacy	Pharmaceutical Sciences and Technology	1965	18	N.A.	N.A.	AICTE Approved (F.No. Western/1-10974417625/2022/EOA)	01/07/2014 to 30/06/2017

Table: A.8.1

9. Programs to be considered for Accreditation vide this application.

Sr. No.	Program Name	Current Year Sanctioned Intake	Current Year Admission (in Nos.)
1.	Master of Technology in Bioprocess Technology	30	21
2.	Master of Technology in Oils, Oleochemicals and surfactants Technology	18	18
3.	Master of Engineering in Plastic Engineering	18	4

Table A.9.1

10. Contact Information of the Head of the Institution and NBA coordinator, if designated:

i. Name: Prof. A. B. Pandit
Designation: Vice-Chancellor
Mobile No: 022-33611001
Email id: vc@ictmumbai.edu.in

ii. NBA coordinator
Name: Professor V. N. Telvekar
Designation: Dean, IQAC
Mobile No: 022-33611111
Email id: vn.telvekar@ictmumbai.edu.in

iii. NBA co-coordinator
Name: Dr. Ashwin Mohan
Designation: Associate Dean, IQAC
Mobile No: 022-33611111 Extension 2665
Email id: as.mohan@ictmumbai.edu.in

PART B: Departmental Information

1. State the Vision and Mission of the Department

Vision:

The department aspires to contribute to India through excellence in technical education and research, to cater the growing needs of plastics manufacturing and processing industries and research institutions.

Mission:

M1: To develop the necessary skills in students with the current scenario, through collaboration with industries and research organization, to meet the expectations of the plastics industries.

M2: To undertake multi-disciplinary research and industry projects and to encourage innovation, growth and development in the emerging areas of new materials and technology.

M3: To develop analytical skills, leadership quality and team spirit in students through balanced curriculum and a judicial mix of co-curricular, extracurricular, and professional activities.

M4: To develop a spirit for product development through effective integration of mold design, design engineering and material study.

M5: To motivate the students to become job providers rather than job seekers.

2. Justification of consistency of the Department Vision and Mission with the Institute Vision and Mission

The department vision is aligned with the vision of the institute so as to generate a skilled and capable human resources and related technology development for industry and society. The program is inculcating a knowledge to enable the students to solve actual industrial problems. The M.E. Plastic Engineering program encourages students to work in cohort for further improvement in team spirit and leadership qualities in the students.

3. Details of all UG & PG Programs offered by the department.

Table: B.3.1 shows the details of all UG and PG programs offered by the department

Sr. No.	PG Program Name	Corresponding UG Program/Department Name	Current Year Sanctioned Intake	Current year Admission (in Nos.)
1	M.E (Plastic Engineering)	N.A.	18	4

Table: B.3.1

4. State the Program Educational Objectives (PEOs) for the PG program(s) under consideration for accreditation.

SR. NO.	PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)
1	To produce graduates who will work efficiently and productively as a Plastic Engineer and Scientist in academia as well as industry in supportive or leading role
2	Be a good learner at all stages of profession by acquiring higher education, professional degrees, or courses.
3	To produce graduates who can be employed successfully in plastic related industries or other related industries or accepted into research programs
4	Aware of the environmental and societal impact of plastic engineering and technology and work within the periphery.

Criteria Summary

Name of the program: Master of Engineering in Plastic Engineering

Criteria No.	Criteria	Mark	Institute Mark
1.	Program Curriculum and Teaching-Learning Processes	125	125
2.	Program Outcomes and Course Outcomes	75	75
3.	Students' Performance	75	51.33
4.	Faculty Contributions	75	60
5.	Laboratories and Research Facilities	75	75
6.	Continuous Improvement	75	70
	Total	**500**	**456.33**

CRITERION-1	PROGRAM CURRICULUM AND TEACHING LEARNING PROCESSES	125/125

1.1. Program Curriculum (35)

1.1.1 State the process for designing the program curriculum (10)

(Institute Marks: 10)

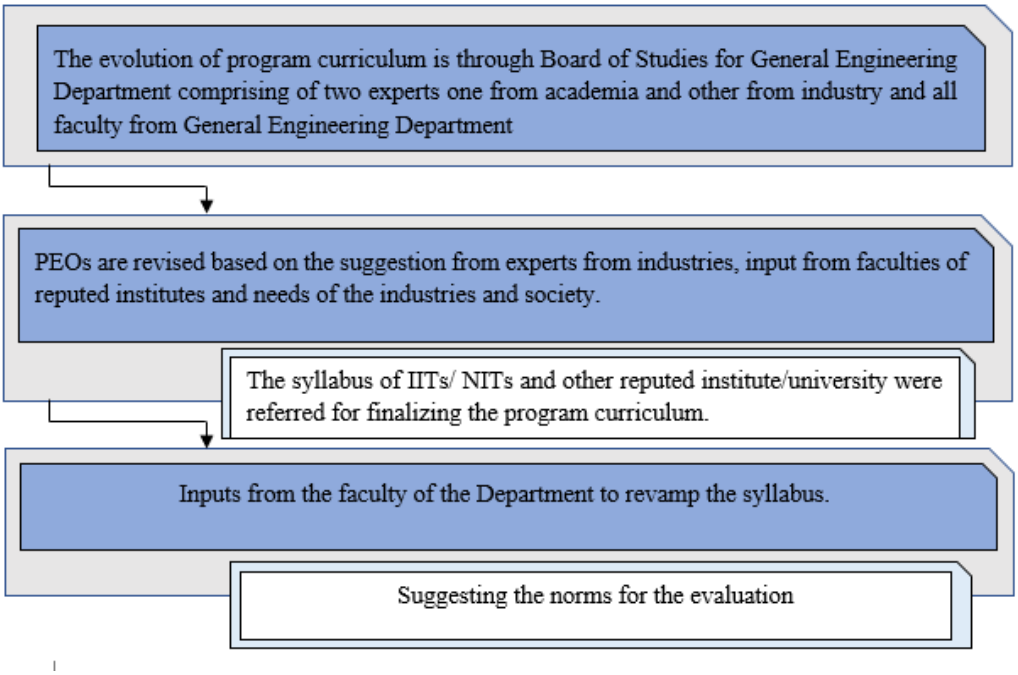


Figure 1.1.1a: Curriculum designing flowchart

Programme is designed based on:

- Recent trends in the field of plastic engineering sector and industry expectations from the plastic engineer.
- Improvements based on feedback from students, alumni.
- Including suggestion from industry expert
- Suggestions from experts from other institutes/universities and Board of studies and quality assurance committee.

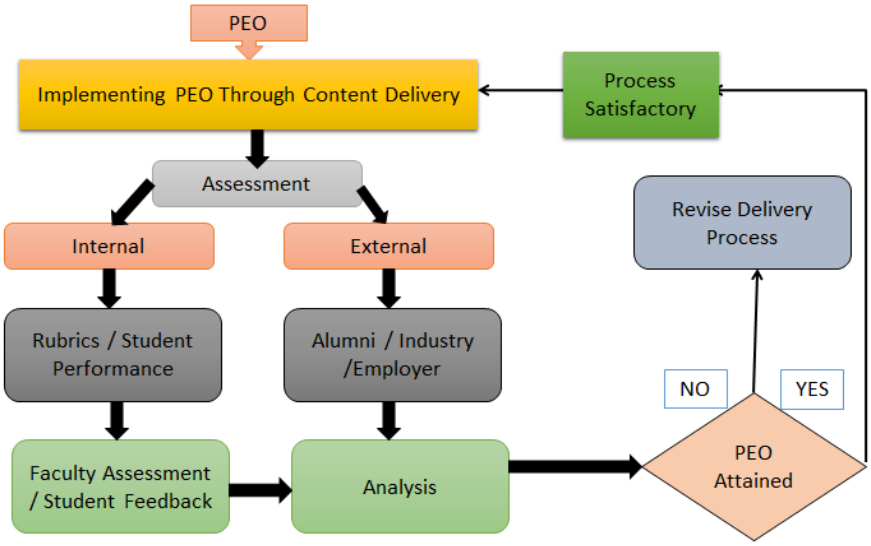


Figure 1.1.1b: Curriculum designing flowchart

Based on these comments, appropriate changes are incorporated-

- Based on recent trends in plastic industry, the course structure is revised.
- New course modules are introduced to ensure that the syllabus is a state of art.
- Laboratory courses are modified to get hands on experience to the students for enhancing their critical thinking based on the current requirements of plastic industries.
- Suggestions from existing students, faculty, passed-out students and industry experts and experts from other institution are taken.

1.1.2 Structure of the Curriculum (5)

(Institute Marks: 5)

Structure of curriculum (Syllabus) for the years 2020-21 and 2021-22

Course code	Course Title	Total No. of Contact Hours				Credits
		L Lectures	T Tutorials	P Practical	Total Hours	
SEMESTER-I						
GET2101	Core I: Technology and Chemistry of Polymers.	2	1	0	3	3
GET2102	Core II: Processing of Plastics	2	1	0	3	3
GET2103	Core III: Plastic Product Design and Testing.	2	1	0	3	3
Elective I (Open Elective)	PHT2106: Research Methodology	2	1	0	3	3

Elective II (Programme Elective)	- GET2113: Finite Element Analysis	2	1	0	3	3
GEP2104	Plastic Processing and Testing lab			6	6	3
GEP2105	Seminar and Critical Review			6	6	3
GEP2106	Research Project I			12	12	6
SEMESTER-II						
GET2107	Core IV: Design of Molds	2	1	0	3	3
GET 2108	Core V: Principles of Plastic Machinery Design	2	1	0	3	3
GET2109	Core VI: CAD/CAM/CAE	2	1	0	3	3
Elective III (Open elective)	GET2117: Plastic Waste Management	2	1	0	3	3
Elective IV (Programme elective)	GET2119: Advance Polymer based materials in Engineering Applications	2	1	0	3	3
GEP2110	CAD/CAM/CAE and Design of Molds lab			6	6	3
GEP2111	Research Project II			12	12	9
SEMESTER III						
Industrial Training of duration of minimum of 15 weeks to maximum of 6 months as per approval of research supervisor and Head of the Department with total assigned credits as 30 and marks as 450						
SEMESTER IV						
Research Projects, Thesis with total assigned credit as 30 and marks as 450						

Structure of curriculum for Syllabus 2022-23

Course code	Course Title	Total No. of Contact Hours				Credits
		L Lectures	T Tutorials	P Practical	Total Hours	
SEMESTER-I						
GET2120	Core I: Chemistry of Polymers and Plastic Materials.	2	1	0	3	3
GET2102	Core II: Processing of Plastics.	2	1	0	3	3
GET2103	Core III: Plastic Product Design and Testing.	2	1	0	3	3
Elective-I (Programme elective)	GET2029-Processing and Mechanics of Composites	2	1	0	3	3
Elective-II (Open elective)	GET2113-Finite Element Analysis	2	1	0	3	3
GEP2121 /HUT2101C /HUP2101C	Research Methodology	2	0	4	6	4
GEP2122	Plastic Processing and Testing Laboratory			6	6	3
GEP2123	Research Project I			4	4	2
SEMESTER-II						
GET2124	Core IV: Design of Plastic Moulds and Dies	2	1	0	3	3
GET2108	Core V: Principles of Plastic Machinery Design	2	1	0	3	3
GET2117	Core VI: Plastic Waste Management	2	1	0	3	3
Elective III (Programme elective)	GET2133: Advance Polymer based materials in Engineering Applications	2	1	0	3	3
Elective IV (Open elective)	GET2135-Project Management Methodology and Planning	2	1	0	3	3
GEP2125	CAD/CAM/CAE and Design of Moulds laboratory	0	0	6	6	3
GEP2126	Research Project II	0	0	12	12	6

SEMESTER-III						
GEP2127	Research Project - III	0	0	48	48	24
SEMESTER-IV						
GEP2128	Research Project - IV	0	0	48	48	24

Table: 1.1.2

1.1.3 State the components of the curriculum (10)

(Institute Marks: 10)

Program curriculum grouping is done based on course components for years 2020-21 and 2021-22

Semester-I			
Course Component	**Curriculum Content (% of total number of credits of the program)**	**Total number of contact hours/week**	**Total number of credits**
Program Core	23.1%	9	9
Program Electives	7.7%	3	3
Open Electives	7.7%	3	3
Mini Projects	0.0%		
Internships/ Seminars	15.4%	6	3
Major Project	30.8%	12	6
Any other (Specify) Practical	15.4%	6	3
Total	**100%**	**39**	**27**

Semester-II			
Course Component	**Curriculum Content (% of total number of credits of the program)**	**Total number of contact hours/week**	**Total number of credits**
Program Core	23.1%	9	9
Program Electives	7.7%	3	3
Open Electives	7.7%	3	3
Mini Projects	0.0%		
Internships/ Seminars	0.0%		
Major Project	46.2%	18	9
Any other (Specify) Practical	15.4%	6	3
Total	**100%**	**39**	**27**

Semester-III			
Course Component	**Curriculum Content (% of total number of credits of the program)**	**Total number of contact hours/week**	**Total number of credits**
Major Project	100.0%	60	30
Total	**100%**	**60**	**30**

Semester-IV			
Course Component	**Curriculum Content (% of total number of credits of the program)**	**Total number of contact hours/week**	**Total number of credits**
Major Project	100.0%	60	30
Total	**100%**	**60**	**30**

Course Component	**Curriculum Content (% of total number of credits of the program)**	**Total number of contact hours/week**	**Total number of credits**
Program Core	9.1%	18.00	18.00
Program Electives	3.0%	6.00	6.00
Open Electives	3.0%	6.00	6.00
Mini Projects	0.0%	0.00	0.00
Internships/ Seminars	3.0%	6.00	3.00
Major Project	75.8%	150.00	75.00
Any other (Specify) Practical	6.1%	12.00	6.00
Total	**100%**	**198.00**	**114.00**

Program curriculum grouping is done based on course components for years 2022-23

Semester-I			
Course Component	**Curriculum Content (% of total number of credits of the program)**	**Total number of contact hours/week**	**Total number of credits**
Program Core	29.0%	9	9
Program Electives	9.7%	3	3
Open Electives	9.7%	3	3
Mini Projects	-	-	-
Internships/ Seminars	12.9%	4	2
Major Project	-	-	-
Any other (Specify) Practical	38.7%	12	7
Total	**100%**	**31**	**24**

Semester-II			
Course Component	**Curriculum Content (% of total number of credits of the program)**	**Total number of contact hours/week**	**Total number of credits**
Program Core	27.3%	9	9
Program Electives	9.1%	3	3
Open Electives	9.1%	3	3
Mini Projects	0.0%	0	0
Internships/ Seminars	36.4%	12	6

Major Project	0.0%		
Any other (Specify) Practical	18.2%	6	3
Total	**100%**	**33**	**24**

Semester-III			
Course Component	**Curriculum Content (% of total number of credits of the program)**	**Total number of contact hours/week**	**Total number of credits**
Major Project	100.0%	48	24
Total	**100%**	**48**	**24**

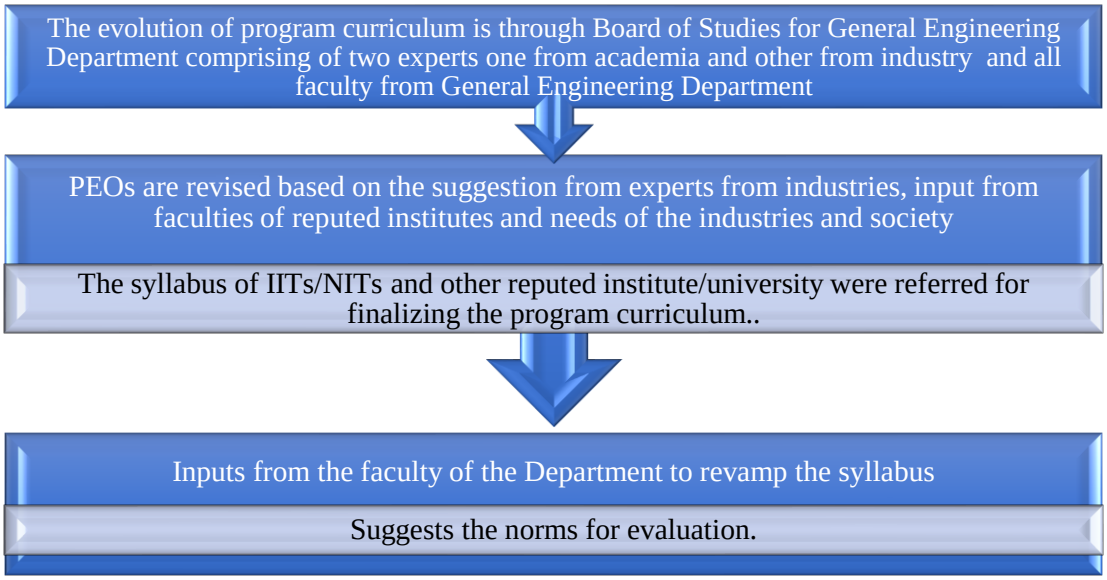
Semester-IV			
Course Component	**Curriculum Content (% of total number of credits of the program)**	**Total number of contact hours/week**	**Total number of credits**
Major Project	100.0%	48	24
Total	**100%**	**48**	**24**

Course Component	**Curriculum Content (% of total number of credits of the program)**	**Total number of contact hours/week**	**Total number of credits**
Program Core	11.3%	18.00	18.00
Program Electives	3.8%	6.00	6.00
Open Electives	3.8%	6.00	6.00
Mini Projects	0.0%	0.00	0.00
Internships/ Seminars	10.0%	16.00	8.00
Major Project	60.0%	96.00	48.00
Any other (Specify) Practical	11.3%	18.00	10.00
Total	**100%**	**160.00**	**96.00**

1.1.4 Overall quality and level of program curriculum (10)

(Institute Marks: 10)

The syllabus was revised in the year 2017-18 and was in effect till the academic year 2021-22. Further revision has taken place and been implemented from the academic year 2022-23.



- M.E Plastic Programme focuses on polymer processing, materials, product design and mold design. Programme also include Computer Aided Design (CAD) and simulation software essential for plastic product development in the industry.
- Programme also encourages for industrial training and project, which provides insight of recent trends in the plastic industries and enhance the ability of the students to tackle industrial challenges and day-to-day problems.
- The students are allowed to complete their research work in the department laboratories as well as in the industries. During project work, the students undertake live-in commercial problem statement to work upon as a research hypothesis. Further literature, experimental work and analysis guidelines with a background of mandatory research methodology course mentioned in the curriculum help the students to carry out their research work and its publication in reputed journals. It also helps the students to gain practical aspect of technology acquiring problem solving skills.
- The courses such as Plastic waste management, Natural fibre composites helps the students to address environmental issues and remedial actions. Similarly, the course Project management methodology and planning provide an insight to the students about project scheduling and execution in the industries.

1.2. Teaching-Learning Processes (90)

(Institute Marks: 90)

1.2.1. Quality of end semester examination, internal semester question papers, assignments, and evaluation (20)

(Institute Marks: 20)

The weightages of different modes of assessments shall be as mentioned below-.

	In-Semester evaluation		End-Semester-Exam	Components of continuous mode
	Continuous mode	Mid Semester-Exam		
Theory	20%	30%	50%	Quizzes, class tests (open or closed book), home assignments, group assignments, *viva-voce* assignments, discussions
Practical	50%	-	50%	Attendance, *viva -voce*, journal, assignments, project, experiments, tests
Research Project-I, II, III, IV			100%	Evaluation will be based on written report evaluation and presentation in front of the external examiner within the Department

In-Semester Evaluation:

a) It is expected that the teacher would conduct at least two assessments (in any form as quizzes, tests, homework, group work etc) under the continuous mode in a Semester.

b) The teacher will announce at the beginning of the respective course the method of conducting the tests under the continuous mode and the assignment of marks.

c) In-semester performance of all students should be displayed and sent to the academic office by the teacher at least 15 days before the end-semester examination.

d) For the theory courses, there will be one mid-semester test for each course to be held as per the schedule fixed in the Academic Calendar.

End-Semester examination:

a) The semester-end examination will cover the full syllabus of the course as well as address all course outcomes designed for a course.

b) For the end semester evaluation of research projects, the student will be expected to submit a written report and make a presentation enhancing their critical thinking and interpretation of results in a scientific manner.

1.2.2. Quality of student projects (30)

(Institute Marks: 30)

The objectives of the research projects enable the students to identify and address challenging problems of industry and their solution by using simulation softwares, the development of new materials such as polymer composites, to fulfill the functional requirement of the product and optimization of processing parameters to enhance the product quality.

- During their research project, the students carry out extensive literature survey to identify the latest development for their research topics. The critical review literature helps them to identify research gaps. Identification of research gap leads to development of methodology to achieve the research objective.
- The process variables are identified to achieve the required product quality and by carrying out simulations and their validation with experimental results. Similarly for composite materials, experimental set up are developed the study of effects of various fillers/fibres, nano-fillers on the material properties.
- The project leads to the development of product with optimum quality by eliminating all the defects and fulfilling industry requirements. Similarly, the development of new composite materials improves the specific property suitable for a particular application.
- The students are able to analyse and interpret the experimental results using various statistical tools, data processing softwares etc.
- Overall presentation includes identification of objective, literature survey, experimental set-up, analysis and interpretation of results and its relevance to suitable application.

List of research project:

Project Year 2020-21		
Roll No.	**Name of Student**	**Project Title**
19PLS201	Akash Valmik Mahajan	Development of Anti-rodent Drip Irrigation Lateral
19PLS202	Harshal Janardan Shatalwar	To Study the Effect of Graphene, GO and RGO Filler Loading on the Properties of Epoxy Composite
19PLS203	Jagadish R	Analysis of Injection Molded Industrial Components Using Existing Simulation Software
19PLS204	Keyur kumar Sureshbhai Vadaliya	Synthesis of modified PVA/Cellulose ultrafiltration membrane for industrial application
19PLS205	Mohit Prakash Salunkhe	Design development and analysis of automotive interior parts
19PLS206	Naveen Nitin Tembhurnikar	Optimization of Injection Moulding Parameters Using Moldflow and Minitab
19PLS207	Paras Manojkumar Tholiya	Design, development and Analysis of Glove Box

19PLS208	Sachin Anant Kamble	Study of Effect of water absorption on Mechanical Properties of Hemp and Sisal Fiber reinforced Polyester Composite
19PLS211	Swagata Ray Chaudhury	Study of the mechanical properties of jute fiber reinforced hybrid composite using carbon nanotubes filler

Project Year 2021-22		
Roll No.	**Name of Student**	**Project Title**
20PLS201	Dipashree Arun Penkar	Study of Wollastonite filled Polyphenylene oxide
20PLS202	Dnyanada Chaudhari	Effect of Graphene Nano fillers on Properties of Polypropylene Composites along with Compatibilizer
20PLS203	Meghna Pratham Humbal	Study of effect of coupling agent and nanofillers on properties of flax fiber reinforced polymer composites
20PLS204	Mehul Sanju Karkar	Development of Polymer Based Filtration Membrane for Industrial applications
20PLS205	Prajwal Suresh Ghadekar	Effect of PLA laminate to improve performance characteristics of Modified MCC reinforced Biodegradable Polyvinyl Alcohol (PVA)/Corn Starch (CS) blended film.
20PLS206	Sai Shrikantrao Deshmukh	Product development of switch cavity injection mold with the help of Moldflow simulation software
20PLS207	Shreyash Vijay Tayde	Simulation on Plastic Injection Molding Parts to Minimize The Defects Using Autodesk Moldflow Plastic Insight Simulation Software
20PLS208	Deepshikha Katiyar	Evaluation of Mechanical Properties of Wollastonite filled Polypropylene Composite
20PLS209	Nabraz Shaikh	Use of Plastic Waste for Asphalt-mixture for Roads
20PLS210	Rutul Bhalchandra Thorat	Use of FRP Wraps in Enhancing the Strength of cement composite
20PLS211	Tanvi Sanjay Suryawanshi	Development of Flax-Pineapple Leaf Fiber Reinforced Unsaturated Polyester resin composite by Dough Molding Compound

Project Year 2022-23		
Roll No.	**Name of Student**	**Project Title**
21PLS202	Akshay Shailesh Jain	Recycling of Non-food packaging materials and converting them into a useful household detergent bottles.
21PLS203	Ashish Jayant Kulkarni	Mechanical and damping performance of Flax fiber Reinforced Polypropylene composites
21PLS204	Avinash Ganesh Chavhan	Plastic process optimization using Taguchi method

21PLS206	Mihir Machindra Jadhav	Replacement of metal parts in automobiles by polymers, composites, and blends
21PLS208	S Jeya Varshini	Lifetime assessment of Recycled polyamide
21PLS209	Sajit Ajithan	Optimization of injection molding process parameters for a studio bottom cover
21PLS210	Shweta Sanjay Pandagale	Biodegradable polymer from banana peels for industrial application
21PLS211	Suraj Rajendra Mhaske	Polypropylene nanocomposites with enhanced thermal and electrical properties for automotive and electronics applications
21PLS212	Vikas Bhausaheb Mhaske	Synthesis of Biodegradable mulching film from bio-polymers and natural fibers for agriculture applications.

1.2.3. Initiatives related to industry interaction including industry internship/ summer training (10)

(Institute Marks: 10)

The program curriculum for M.E. Plastic Engineering is designed by considering the feedback and suggestions of the academicians from various reputed institutions such as IIT's, NIT's, many central and state government institutions and industry personals.

Shri. K. Vysyaraju (Operational Manager, Siemens Industries, Dr. M B Parmar (Director, Polyblend Masterbatches Pvt. Ltd.), Shri. Gopal Kabra (Director, VEM Tools Pvt. Ltd.), Ms. Pranali Narvekar (Polyblend colour Concentrate) and Shri. Manoj Patil from Volkswagen suggested incorporating the use of various software's and their application from the industry point of view. Addition of new elective courses such as Mold Manufacturing Technologies, Modelling and simulation of polymer rheology, Six Sigma and Statistics for industrial process improvement, Advanced Processing Technologies, Total Quality Management, Project Management Methodology and Planning and other improvements in the existing courses is helpful in the overall improvement of the curriculum. This process of improving the program and curriculum development is carried out through the BOS (Board of Studies) committee.

- **Industry involvement in partial delivery of any regular courses for students**:

The involvement of the industry experts is considered for delivering lectures to subjects in the M.E. Plastic Engineering Programme.

Dr. Asit Samui (Retired scientist from Naval Materials Research Laboratory of Government of India) takes the course of Technology and Chemistry of Polymers, Dr. M B Parmar (Director, Polyblend Masterbatches Pvt. Ltd.) and Dr. Tipanna (Director, Polyset industry Pvt. Ltd.) conducts lectures for Plastic waste management (an elective subject) in second semester of M.E program. Shri Ravindrakumar Gupta (Vice president, Kokuyu Camlin Pvt. Ltd.) delivers his expertise in partially teaching the course of Plastic product design and testing.

The practical experience received from the visiting faculties helps the students to understand the usefulness of the subjects which are taught to them.

- **Industrial Visit for students**:

  The industrial visits were organised for M.E students such as-

  - Mutual Industries Ltd, Vasai, Dist: Palghar (12-May-2023)
  - Sarvottam Polymers Ltd, Vasai, Dist: Palghar (12-May-2023)

- **Industry Certification Training Program:**

  - Five-days hands-on training cum workshop on ANSYS simulation software offered by CADFEM- ANSYS Ltd. Pune from 17th April to 21st April 2023 was organised.

- **Expert Lectures by Industry Persons:**

  The department conducts expert lectures from various industries to expose the students to know the current developments on-going in the plastic industries.

Following are the list of industry expert speakers from various plastic industries-

Sr. No.	Topic	Speaker Details	Date
1	Role of Simulation Softwares in Injection Molding of Plastics	Dr. Mahesh Divekar, CAE Leader, Performance Materials BASF India Ltd.	03 April 2022
2	Polymer R and D readiness	Dr. J.N. Kapadia, Head of Product Development at Henkel Adhesives Mumbai	28 March 2021
3	Prof. B.D. Tilak Endowment Lecture on "Industry 4.0"	Prof. Pradeep Kumar, IIT Roorkee	22 January 2021
4	Masterbatches for plastics	Dr. M.B. Parmar, Managing Director at Polyblend Colour Concentrates Vapi	15 January 2021
5	Advanced plastic product design-know how with case study	Mr. Ravindra Gupta, Vice President, Camlin Kokuyo Mumbai	02 January 2021
6	Cost effective water storage technologies for rural area	Mr. U.M. Paranjpe, Trustee, Jalavardhini Pratisthan Mumbai (a NGO)	29 November 2020
7	Integrated Urban Water Management-Why, What and How	Dr. Bhakti Devi, Sydney Water Corporation, Sydney, Australia	25 November 2020
8	Use of Glass and Carbon fibre Polymer composites for repairs, retrofit and rehabilitation of Structures	Dr. Mangesh Joshi, Founder and director at Sanrachana Structural Strengthening Pvt. Ltd. Mumbai.	21 November 2020
9	Plastic Pipes up to 2.5 m diameter for conveyance of water and wastewater	Dr. Madhusudan Chaudhari, Vice President, Jain Irrigation Systems Limited Pune	14 November 2020

In a semester one or two site visits are done to build better industry institute interaction. Many guest lectures of experts from these industries are organized, during these lectures faculty and students interact

with them to understand the latest know-how of plastic industry. Our faculty members regularly interact with various plastic industries, meet alumni, and observe the latest developments in various fields of plastic engineering. Such interactions have opened the doors of opportunities for the industry candidates. Currently two-Masters students from DOW and TVS motors have joined M.E Plastic Engineering course. One Ph.D. student from BASF has joined Ph.D. course.

The following table gives the details of the industries where students have done their industrial training-

Year 2020-21		
Sr. No.	**Name of Student**	**Name of the industry providing training**
1.	Akash Valmik Mahajan	Tata Faurecia Ltd. Pune
2.	Mohit Prakash Salunkhe	Tata Fauracia Ltd. Pune
3.	Paras Manojkumar Tholiya	Tata Fauracia Ltd. Pune

Year 2021-22		
Sr. No.	**Name of Student**	**Name of the industry providing training**
1.	Sai Shrikantrao Deshmukh	Varroc Engineering Ltd. Aurangabad
2.	Shreyash Vijay Tayde	Motherson Automitive Technology and Engineering Khed, Pune
3.	Deepshikha Katiyar	A.G. Industries Pvt. Ltd. Gujarat
4.	Rutul Bhalchandra Thorat	Thermoplast Industries, Lonavala.
5.	Tanvi S. Suryawanshi	Shubhada Polymer Products Pvt. Ltd. Mumbai

Year 2022-23		
Sr. No.	**Name of Student**	**Name of the industry providing training**
1.	Akshay Shailesh Jain	Dow Chemicals International Pvt. Ltd. Mumbai
2.	S Jeya Varshini	Bosch India Pvt. Ltd. Banglore
3.	Sajit Ajithan	Pro Mold Pvt. Ltd. Navi Mumbai
4.	Suraj Rajendra Mhaske	Reliance Industries Pvt. Ltd. Mumbai
5.	Vikas Bhausaheb Mhaske	280 Carbon Systems Pvt. Ltd. Mumbai

Year 2023-24		
Sr. No.	**Name of Student**	**Name of the industry providing training**
1.	Ankur Singh	Plastalloy Pvt. Ltd.
2.	Priya Sandip Kumar Gupta	Avient Corporation Mumbai
3.	Sudarshan Sanjay Kabugade	Avient Corporation Mumbai
4.	Utkarsh Devidas Chavan	Avient Corporation Pune

1.2.4. Participation of Industry professionals in curriculum development, as examiners, in major projects (10)

(Institute Marks: 10)

Experts from industry and academic institutions are invited for the evaluation of the thesis and for conducting the open defense examination of the students. The Board of Studies (BOS) for the General Engineering Department is comprising of many experts from industry who participate in the curriculum development along with the feedback of various stakeholders.

The following table gives the industry professionals, who always spare time for these activities.

Examiners appointed (in last three years):

Sr. No.	Name	Designation
1.	Mr. Ravindra Kumar Gupta	Vice-President(R&D), Camlin Kokuyu India Ltd.
2.	Dr. M.B. Parmar	Managing Director, Polyblend Masterbatch Industries
3.	Mr. V. Karunakara Raju	Head – Manufacturing & supply management, Siemens Ltd.
4.	Dr.Mahesh Dhekane	Manager Technology, Clariant Chemicals (India) Ltd.
5.	Mr. Gopal Kabra	Director, VEM Tooling (India) Pvt. Ltd
6.	Dr. Jitendra Kapadia	Head, Product Development Henkel Adhesive Technologies India Pvt Ltd
7.	Manoj B. Patil	Head Supplier Readiness Management, Volkswagen Group (India)
8.	Mr. Sagar Waghmare	Assistant Professor, SIES Nerul
9.	Dr. Sandesh Ramteke	Assistant Professor, SIES Nerul
10.	Mr. Girish Nandu Khadke	Heera Plastics Pvt. Ltd., Jalgaon
11.	Dr. Kedar Chaudhari	Diversey India Pvt. Ltd.
12.	Mr. Sachin Gawande	TATA Faurecia Pvt. Ltd.

1.2.5. Quality of laboratory work given (20)

(Institute Marks: 20)

The laboratories of the department are well equipped, providing wide range of workability.

GEP 2104 Plastic Processing and Testing laboratory:

Sr. No.	Name of experiments/ syllabus	Equipment
1	Extrusion of various polymer	Twin-screw extruder
2	Preparation of polymer composites	Twin-screw extruder
3	Compression molding	Compression Moulding machine
4	Injection molding	Injection Moulding machine
6	Preparation of composite samples and plastic components	3D printer
7	Impact test to find out impact strength of the polymer	Izod impact testing machine
8	To find the melt flow index of various polymers	Melt flow index apparatus
9	Measurement of heat deflection temperature	Heat Deflection temperature tester
10	Measurement of Hardness	Shore Hardness Tester
11	Determination of Tensile Strength and percentage elongation	Universal Testing Machine

GET 2110 Design of molds and CAD/CAM/CAE laboratory:

Sr. No.	Name of experiments/syllabus	Equipment/lab
1	Design and draw compression molds for plastic products	Drawing hall
2	Design and draw transfer molds for plastic products	Drawing hall
3	Design and draw Injection molds for plastic products	Drawing hall
4	Understand the basic principles of design of extrusion dies	Drawing hall
5	Make solid models of plastic and mechanical components	CAD/CAM lab
6	Design various molds and dies using computer-aided design	CAD/CAM lab
7	Understand the basics of the computer-aided manufacturing program	CAD/CAM lab
8	Analyze variation in pressure, temperature and time graph using Computer Aided program	CAD/CAM lab

CRITERION-2	PROGRAM OUTCOMES	75/75

2.1. Establish the connect between the courses and POs (15)

(Institute Marks: 15)

Connection between PO's and courses for the syllabus year 2020-21, 2021-22 and 2022-23

	PO	Course
2020-21 and 2021-22	PO1	GET2101, GET2102, GET2103, GEP2106, GET2107, GEP2111, GET2117
	PO2	GEP2106, GEP2111
	PO3	GET2101, GET2102, GET2103, GET2107, GET2117, GET2108, GET2109, GET2119
	PO4	GET2103, GET2107.GET2108, GET2109, GET2119
	PO5	GET2101, GET2102, GET2103, GET2107, GET2117, GET2108, GET2109, GET2119
2022-23	PO	Course
	PO1	GET2120, GET2102, GET2103, GET2129, GET2113, HUT2101C, GET2108, GET2117, GET2113, GET2135
	PO2	GET2120, GET2102, GET2103, GET2129, GET2113, HUT2101C, GET2108, GET2117, GET2113, GET2135
	PO3	GET2120, GET2102, GET2103, GET2113, HUT2101C, GET2108, GET2117, GET2113, GET2135
	PO4	GET2120, GET2102, GET2103, GET2129, GET2113, HUT2101C, GET2108, GET2117, GET2113, GET2135
	PSO	GET2120, GET2102, GET2103, GET2129, GET2113, HUT2101C, GET2108, GET2117, GET2113, GET2135

Table 2.1.1

POs of M.E (Plastic Engineering) for the year 2020-21 and 2021-22:

SR. No.	PROGRAM OUTCOMES (POS)	Level
PO1	An ability to independently carry out research or investigation and development work to solve practical problems	**K5**
PO2	An ability to write and present a substantial technical report or document	**K6**
PO3	An ability to demonstrate a degree of mastery over the area of plastic engineering and technology	**K5**
PO4	An ability to use modern tools, software, equipment, etc. to analyze and obtain the solution to the problems	**K5**

PO5	An ability to systematically break up complex problems in realizable steps related to mold design, processing of plastic, plastic product design and solve them.	**K4**

Following table represents the correlation between COs and POs and PSOs for the year 2020-21 and 2021-22

SEMESTER I							
Subject			**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
GET 2101: Technology and Chemistry of Polymers.			K5	K6	K5	K5	K4
	CO1	K4	3	2	3	3	3
	CO2	K5	3	3	3	3	3
	CO3	K3	2	2	2	2	3
	CO4	K2	2	1	2	2	2
GET 2102: Processing of Plastics			**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
			K5	K6	K5	K5	K4
	CO1	K3	2	2	2	2	3
	CO2	K3	2	2	2	2	3
	CO3	K5	3	3	3	3	3
	CO4	K3	2	2	2	2	3
	CO5	K3	2	2	2	2	3
GET 2103 – Plastic Product Design and Testing.			**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
			K5	K6	K5	K5	K4
	CO1	K4	3	2	3	3	3
	CO2	K6	3	3	3	3	2
	CO3	K3	2	2	2	2	2
	CO4	K3	2	2	2	2	2
	CO5	K4	3	2	3	3	3
	Course	**K6**	**3**	**3**	**3**	**3**	**2**
GEP2106: Research Project I			**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
			K5	K6	K5	K5	K4
	CO1	K3	2	2	2	2	3
	CO2	K4	3	2	3	3	3
	CO3	K4	3	2	3	3	3
SEMESTER II							
GET 2107 -Design of Moulds			**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
			K5	K6	K5	K5	K4
	CO1	K6	3	3	3	3	2
	CO2	K3	2	2	2	2	3
	CO3	K4	3	2	3	3	3
	CO4	K6	3	3	3	3	2
GET 2108- Principles of Plastic Machinery Design			**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
			K5	K6	K5	K5	K4
	CO1	K3	2	2	2	2	3
	CO2	K3	2	2	2	2	3
	CO3	K3	2	2	2	2	3
	CO4	K4	3	2	3	3	2
	CO5	K4	3	2	3	3	3

	CO6	K3	2	2	2	2	3
GET 2109- CAD/CAM/CAE:			**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
			K5	K6	K5	K5	K4
	CO1	K3	2	2	2	2	3
	CO2	K6	3	3	3	3	2
	CO3	K3	2	2	2	2	3
	CO4	K4	3	2	3	3	3
GEP21111: Research Project II			**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
			K5	K6	K5	K5	K4
	CO1	K3	2	2	2	2	3
	CO2	K4	3	2	3	3	3
	CO3	K4	3	2	3	3	3
GET 2117: Plastic waste Management			**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
			K5	K6	K5	K5	K4
	CO1	K4	3	2	3	3	3
	CO2	K4	3	2	3	3	3
	CO3	K4	3	2	3	3	3
	CO4	K4	3	2	3	3	3
GET 2119 - Advanced Polymer based Materials in Engineering applications.			**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
			K5	K6	K5	K5	K4
	CO1	K6	3	3	3	3	2
	CO2	K3	2	2	2	2	3
	CO3	K3	2	2	2	2	3
	CO4	K3	2	2	2	2	3
	CO5	K3	2	2	2	2	3
	CO6	K3	2	2	2	2	3

3, 2, 1 represent strong, moderate and weak correlation; '-' refers to no correlation.

Following table represents the correlation between COs and POs and PSOs for the year 2022-23

SEMESTER-I							
GET2110- Chemistry of plastics and polymer materials	**CO\PO**		**PO1**	**PO2**	**PO3**	**PO4**	**PSO**
			K5	K6	K5	K5	K4
	CO1	K2	2	2	-	1	3
	CO2	K3	3	3	-	2	3
	CO3	K4	3	-	3	2	2
	CO4	K3	3	2	-	2	3
	CO5	K3	2	2	2	1	2
GET 2102- Processing of Plastics	**CO\PO**		**PO1**	**PO2**	**PO3**	**PO4**	**PSO**
			K5	K6	K5	K5	K4
	CO1	K5	3	2	-	2	3
	CO2	K4	3	2	-	2	3
	CO3	K3	3	2	3	1	2
	CO4	K3	2	-	-	1	2
	CO5	K2	2	2	-	2	2
GET2103- Plastic Product design and testing	**CO\PO**		**PO1**	**PO2**	**PO3**	**PO4**	**PSO**
			K5	K6	K5	K5	K4
	CO1	K4	3	2	2	1	2
	CO2	K6	3	2	3	2	2

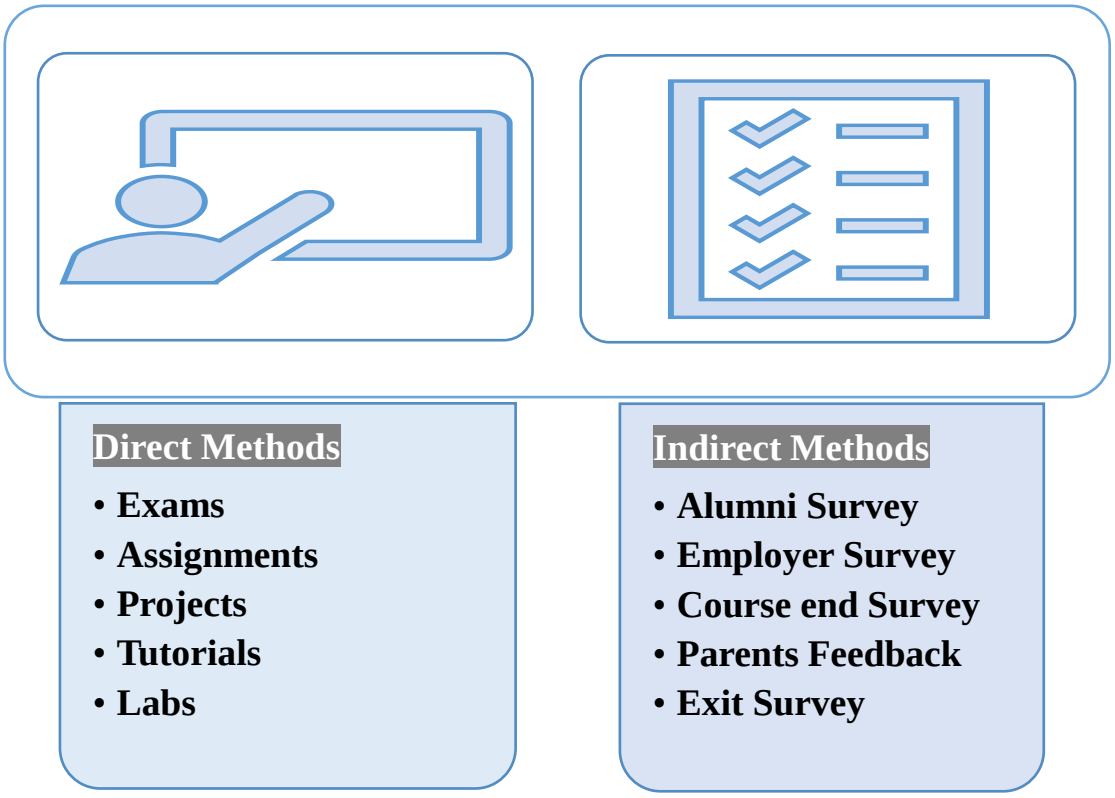
	CO3	K3	2	2	3	2	2
	CO4	K3	2	1	-	2	2
	CO5	K4	3	2	-	3	2
GET2129- Processing and Mechanics of Composites	**CO\PO**		**PO1**	**PO2**	**PO3**	**PO4**	**PSO**
			K5	K6	K5	K5	K4
	CO1	K4	3	2	-	3	2
	CO2	K4	2	2	-	2	2
	CO3	K4	3	2	-	2	2
	CO4	K2	3	2	-	2	2
GET2113- Finite Element Analysis	**CO\PO**		**PO1**	**PO2**	**PO3**	**PO4**	**PSO**
			K5	K6	K5	K5	K4
	CO1	K2	3	2	2	2	2
	CO2	K6	2	-	-	-	2
	CO3	K3	2	-	-	-	2
	CO4	K3	2	-	-	-	2
HUT2101C- Research Methodology	**CO\PO**		**PO1**	**PO2**	**PO3**	**PO4**	**PSO**
			K5	K6	K5	K5	K4
	CO1	K2	2	3	3	3	3
	CO2	K2	2	2	2	1	2
	CO3	K3	2	3	3	3	2
	CO4	K2	2	3	2	2	2
	CO5	K4	2	3	2	2	2
	CO6	K5	-	3	-	3	2
	CO7	K1	-	3	-	2	2
	CO8	K6	2	3	-	3	-
SEMESTER-II							
GET2124- Design of plastic Molds and Dies	**CO\PO**		**PO1**	**PO2**	**PO3**	**PO4**	**PSO**
			K5	K6	K5	K5	K4
	CO1	K2	3	2	2	-	2
	CO2	K3	3	1	-	2	2
	CO3	K2	3	-	2	-	2
	CO4	K6	3	-	2	-	3
	CO5	K2	3	2	2	2	3
	CO6	K2	3	-	2	-	2
	CO7	K2	2	2	3	2	1
GET2108- Principles of Plastic Processing Machinery Design	**CO\PO**		**PO1**	**PO2**	**PO3**	**PO4**	**PSO**
			K5	K6	K5	K5	K4
	CO1	K5	3	2	-	2	3
	CO2	K4	2	-	-	2	2
	CO3	K2	2	-	-	2	3
	CO4	K4	3	2	-	2	3
	CO5	K2	2	-	-	1	2
GET2117- Plastic Waste Management	**CO\PO**		**PO1**	**PO2**	**PO3**	**PO4**	**PSO**
			K5	K6	K5	K5	K4
	CO1	K2	2	2	3	3	2
	CO2	K3	2	2	2	3	2

	CO3	K5	2	-	2	3	2
	CO4	K4	2	1	2	3	2
	CO5	K2	2	1	3	2	2
GET2113- Advanced Polymer Based Materials in Engineering Applications	**CO\PO**		**PO1**	**PO2**	**PO3**	**PO4**	**PSO**
			K5	K6	K5	K5	K4
	CO1	K6	2	3	-	2	2
	CO2	K3	1	2	-	2	2
	CO3	K3	1	2	-	2	2
	CO4	K3	2	2	2	2	2
	CO5	K3	3	2	3	2	3

3, 2, 1 represent strong, moderate and weak correlation; '-' refers to no correlation.

2.2. Attainment of Program Outcomes (60)

(Institute Marks: 60)



2.2.1. Describe the assessment tools and processes used to gather the data upon which the evaluation of Program Outcome is based (20)

(Institute Marks: 20)

The assessment of the students is carried out through the following methods:

- Assignments
- MCQ tests/ Class tests

- Student projects & presentations
- Experimental laboratory work
- Mid-Semester examination and
- End Semester examination

Calculation of Course Outcomes COs (Direct and Indirect)

A) Assessment tools used to measure student learning and Course Outcomes:

- End Semester Exam: End Semester Score (25 M),
- Continuous Evaluation: Score for Continuous (10 M) and
- Mid-SEM Examination (15 M)

The assessment of the course outcomes (COs) has been performed by the respective subject faculty. The corresponding steps have been discussed below**.**

B) The CO-attainment calculation for end-semester (Direct)

Step I: Percentage weightage (W) has been given to each of the COs of a course (GET2108: Principles of Plastic Machinery Design) corresponding to each question asked in the end semester question paper.

Qn No.	Maximum Marks allotted	CO1	CO2	CO3	CO4	CO5	CO6
Q1	5				100%		
Q2	5			100%			
Q3	5	100%					
Q4	5		100%				
Q5	5				60%	40%	
Q6	5						100%

Step II: Final marks for each question are entered for each individual student, for a subject mentioned in the table.

GET2108- Principles of Plastic Machinery Design	End Sem (ES) Marks						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Total (ES)**
Roll. No.	**5**	**5**	**5**	**5**	**5**	**5**	**25**
20PLS201	4	4	4	2	-	5	19
20PLS202	4	5	5	5	-	5	24
20PLS203	4	4	5	-	5	5	23
20PLS204	4	4	4	-	4	5	21
20PLS205	4	3	4	2	-	2	15
20PLS206	4	4	5	2	5	-	20
20PLS207	4	4	5	-	5	5	23
20PLS208	3	4	4	-	5	5	21
20PLS209	4	4	5	-	5	5	23

20PLS210	4	4	5	-	3	4	20
20PLS211	4	4	5	2	5	-	20

Step III: Calculation of CO wise score from Question wise marks. It is calculated as follows.

$$\boldsymbol{CO - attainment} = \sum(\boldsymbol{Marks\ scored\ in\ the\ individual\ question})\boldsymbol{x\ CO}\%$$

For example-1, consider calculation for seat number 20PLS203,

$\mathrm{CO1} = (1.0 * \text{Marks scored in Q3})$

$\mathrm{CO1} = (1.0 * 5)$

$\mathrm{CO1} = 5$

For example-2, consider calculation for seat number 20PLS203,

$\mathrm{CO4} = (1.0 * \text{Marks scored in Q1}) + (0.6 * Marks\ scored\ in\ Q5)$

$\mathrm{CO4} = (1.0 * 4) + (0.6 * 5)$

$\mathrm{CO4} = 4 + 3 = 7$

The table below shows the calculation of the COs for each candidate as explained above.

Roll. No.	Marks attained in CO1	Marks attained in CO2	Marks attained in CO3	Marks attained in CO4	Marks attained in CO5	Marks attained in CO6
20PLS201	4	2	4	4		5
20PLS202	5	5	5	4		5
20PLS203	5		4	7	2	5
20PLS204	4		4	6	2	5
20PLS205	4	2	3	4		2
20PLS206	5	2	4	7	2	
20PLS207	5		4	7	2	5
20PLS208	4		4	6	2	5
20PLS209	5		4	7	2	5
20PLS210	5		4	6	1	4
20PLS211	5	2	4	7	2	
No. of students attempted CO	**11**	**5**	**11**	**11**	**8**	**9**

Step-IV: Average marks for each CO's were calculated.

	CO1	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Average marks of each CO	4.6	2.6	4.0	5.9	1.9	4.6

Step-V: No. of students equal and above average is counted.

No. of students equal and above average (from Step-3)	7	1	10	7	6	7

Step-VI:

$$\text{Percentage CO1 attainment for end semester} = \frac{\text{No. of students equal and above average}}{\text{No. of students attempted the CO}}$$

$$= \frac{7}{11} * 100\% = 63.63\%$$

Step-VII: The table below shows all the attainment calculated as per Step-VI for End -Semester.

	CO1	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
% CO attainment (End Sem)	64%	20%	91%	64%	75%	78%

Step-VIII: Calculation of %CO attainment for Continuous assessment (Mid-Semester + Class test OR Assignment)

1. The continuous assessment (CA) marks (includes Class tests, assignments etc.) and Mid-semester (MS) marks of each student is tabulated and totalled.

   i.e., Total Marks obtained by a student in CA and MS = (Marks scored in CA) + (Marks scored in MS)

2. Average marks are obtained for the entire class.
3. Determined the number of students scoring equal and above average.
4. Percentage CO attainment from CA and MS is determined.

$$\%\ attainment = \frac{No.of\ students\ equal\ and\ above\ average}{Total\ no.of\ students}$$

$$= \frac{6}{11} * 100\% = 55\%$$

Roll. No.	**CA Marks**	**MS Marks**	**Total**
	Out of 10	**Out of 15**	
20PLS201	7	12	19
20PLS202	10	14	24
20PLS203	8	13	21
20PLS204	9	14	23
20PLS205	7	14	21
20PLS206	9	13	22
20PLS207	8	14	22
20PLS208	7	10	17

20PLS209	9	14	23
20PLS210	10	9	19
20PLS211	9	13	22
Average			21.2
No. of students equal and above average			6
% CO attainment (CA and MS)			**55%**

Step-IX: Final attainment (direct) is calculated and shown in the table below-

The final attainment is calculated by taking average of CO attainment of End Semester (ES) and CO attainment of Continuous Assessment and Mid Semester (CA and MS). We have set the target for a particular course to calculate the % attainment for each CO's. The %CO obtained is divided by the set target to achieve the class attainment for course GET2108.

$$Average\ attainment\ = \frac{Attainment\ to\ CO\ for\ ES\ +\ Attainment\ to\ CO\ for\ MS\ and\ CA}{2}$$

$$Final\ attainment\ = \frac{Average\ attainment\ (\%)}{Set\ target\ value\ (\%)}$$

If the final attainment obtained for a CO is greater than 100%, then we consider the target CO to be 100%.

Course Outcome	CO1	CO2	CO3	CO4	CO5	CO6
Attainment to CO for End Sem	67%	50%	78%	60%	25%	78%
Attainment to CO for Mid Sem and CA	70%	70%	70%	70%	70%	70%
Average attainment	68.33%	60.00%	73.89%	65.00%	47.50%	73.89%
Set Target attainment (%)	60%	60%	60%	60%	60%	60%
Final Attainment CO (%)	100.00%	100.00%	100.00%	100.00%	79.17%	100.00%

Calculation of CO Attainment (Indirect)

1. Feedback for all the subjects with respective COs has been taken from students using a google spreadsheet.
2. Score from each student is obtained for courses in the scale of 1 to 3 with respect to the Relevance of the courses in their present occupation, where 1 indicating weak relation, 2 indicating moderate relation and 3 indicating strong relation.

Relation	Score
High (Strong)	3
Medium	2
Weak (low)	1

3. Average score was calculated as below-

$$= \sum \frac{score\ from\ student * no.of\ students}{Total\ no.of students}$$

Indirect Attainment for year 2021-22

Course Code	GET 2101	GET 2102	GET 2103	GEP 2104	GEP 2105	GET 2107	GET 2108	GET 2109	GEP 2110
Roll No.									
21PLS202	3	3	3	3	2	3	2	3	3
21PLS204	2	3	2	2	2	3	3	2	2
21PLS206	3	3	3	3	3	3	3	2	3
21PLS208	3	3	3	3	3	2	3	2	2
21PLS209	3	3	3	3	3	3	3	3	3
21PLS210	3	3	3	3	3	3	3	3	3
21PLS211	3	3	3	3	3	3	3	3	3
21PLS212	3	3	3	3	3	2	2	3	2
Average	2.88	3.00	2.88	2.88	2.75	2.75	2.75	2.63	2.63
Feedback above average	7	8	7	7	6	6	6	5	5
% CO attainment	87.50%	100%	87.50%	87.50%	75.00%	75.00%	75.00%	62.50%	62.50%

Indirect Attainment for year 2020-21

Course Code	GET 2101	GET 2102	GET 2103	GEP 2104	GEP 2105	GET 2107	GET 2108	GET 2109	GEP 2110
Roll No.									
20PLS202	3	2	2	3	3	3	3	3	3
20PLS204	2	3	3	2	3	3	2	3	3
20PLS205	3	3	3	3	3	3	3	3	3
20PLS206	3	3	3	3	2	3	2	3	2
20PLS208	2	3	3	3	3	3	3	3	3
20PLS209	3	3	3	3	3	3	3	3	3
Average	2.7	2.8	2.8	2.8	2.8	3.0	2.7	3.0	2.8
Feedback above average	4	5	5	5	5	6	4	6	5
% CO attainment	66.67%	83.33%	83.33%	83.33%	83.33%	100%	66.67%	100%	83.33%

C) Sample calculation for PO and PSO attainment for the subject GET2103 for the academic year 2022-23.

Step-I: The relation between course outcome and program outcome (for each course) is determined where 3, 2 and 1 denote strong, medium and weak correlation, respectively and '-' refers to no correlation, as shown in the table 2.2.1a

Table 2.2.1a: Relation between CO and PO for course GET2103, for academic year 2022-23

Subject Code	GET2103			Sem:	I
CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PSO**
CO1	3	2	2	1	2
CO2	3	2	3	2	2
CO3	2	2	3	2	2
CO4	2	1	-	2	2
CO5	3	2	-	3	2

Step-II: Using % CO attainment data, we calculate the PO attainment for each course using the matrix defined in Step-I. Therefore, the contribution of each CO to each PO is calculated. An example of PO1 calculation for GET2103 (Plastic Product Design and Testing) for the academic year 2022-2023 is given below-

$$\frac{(87.74 * 3 \ + \ 86.81 * 3 \ + \ 87.89 * 2 \ + \ 85.94 * 2 \ + \ 87.50 * 3)}{(3 + 3 + 2 + 2 + 3)} = 87.74\%$$

Step III: Table 2.2.1b shows the calculation of all the PO's and PSO corresponding to each %CO attainment for the course GET2103 for academic year 2022-23. Likewise, we calculated the PO and PSO Attainment levels of all the courses, represented in table 2.2.1c

Table 2.2.1b: %POs attained for course GET2103, for academic year 2022-23

Subject Code	% CO attainment	GET2103			Sem:	I
CO\PO		**PO1**	**PO2**	**PO3**	**PO4**	**PSO**
CO1	87.74%	3	2	2	1	2
CO2	86.81%	3	2	3	2	2
CO3	87.89%	2	2	3	2	2
CO4	85.94%	2	1	-	2	2
CO5	87.50%	3	2	-	3	2
% PO attainment		87.74%	86.81%	87.89%	85.94%	87.50%

Step-IV: Table 2.2.1c represents %PO attainment for all courses in the academic year 2022-23.

Table 2.2.1c: %POs attained (Direct) for all courses, for academic year 2022-23

	Subject Code	PO1	PO2	PO3	PO4	PSO
Batch 2022-23	GET2120	78.53%	83.33%	70.83%	78.13%	80.13%
	GET2102	97.76%	97.57%	100.00%	97.57%	97.57%
	GET2103	87.74%	86.81%	87.89%	85.94%	87.50%
	GET2129	93.94%	94.44%	-	93.21%	94.44%
	GET2113	96.30%	100.00%	100.00%	100.00%	95.83%
	HUT2101C	94.44%	96.38%	94.44%	97.37%	95.56%
	GET2117	93.33%	94.44%	93.06%	92.86%	93.33%
	GET2108	88.89%	83.33%	-	90.74%	89.74%
	GET2124	87.50%	88.10%	89.74%	88.89%	86.67%
	GET2133	81.79%	82.07%	83.33%	83.33%	83.33%
	GET2135	76.39%	76.39%	70.83%	78.13%	76.39%
	Average % PO	**88.78%**	**89.35%**	**87.79%**	**89.65%**	**89.14%**

The %PO attained in a particular course is converted on a scale of 3. The table below represents the PO's attained on a scale of 3.

$$PO\ attained\ = (Average\ \%\ PO)\ * \frac{3}{100}$$

Table 2.2.1d: POs attained (Direct) of all courses, for the academic year 2022-23

	Subject Code	PO1	PO2	PO3	PO4	PSO
Batch 2022-23	GET2120	2.36	2.50	2.13	2.34	2.40
	GET2102	2.93	2.93	3.00	2.93	2.93
	GET2103	2.63	2.60	2.64	2.58	2.63
	GET2129	2.82	2.83	-	2.80	2.83
	GET2113	2.89	3.00	3.00	3.00	2.88
	HUT2101C	2.83	2.89	2.83	2.92	2.87
	GET2117	2.80	2.83	2.79	2.79	2.80
	GET2108	2.67	2.50	-	2.72	2.69
	GET2124	2.63	2.64	2.69	2.67	2.60
	GET2133	2.45	2.46	2.50	2.50	2.50
	GET2135	2.29	2.29	2.13	2.34	2.29
	Average	**2.66**	**2.68**	**2.63**	**2.69**	**2.67**

2.2.2. POs attainment levels with observations (40)

(Institute Marks: 40)

The PO attainment is tabulated below for the academic years 2020-21 (Table 2.2.2a), 2021-22 (Table 2.2.2b) and 2022-23 (Table 2.2.2c) respectively-

Table 2.2.2a: POs attained (Direct) of all courses on a scale of 3, for the academic year 2020-21

	Subject Code	PO1	PO2	PO3	PO4	PO5
Batch 2020-21	GET2101	2.16	1.82	1.83	1.83	1.82
	GET2102	2.39	2.39	2.39	2.39	2.37
	GET2103	2.53	2.54	2.53	2.53	2.53
	GET2113	2.83	3.00	3.00	3.00	2.81
	GET2107	2.71	2.73	2.71	2.71	2.74
	GET2108	2.82	2.80	2.82	2.82	2.79
	GET2109	3.00	3.00	3.00	3.00	3.00
	GET2119	2.35	2.35	2.35	2.35	2.27
	Average	**2.60**	**2.58**	**2.58**	**2.58**	**2.54**

Table 2.2.2b: POs attained (Direct) of all courses on a scale of 3, for the academic year 2021-22

	Subject Code	PO1	PO2	PO3	PO4	PO5
Batch 2021-22	GET2101	2.18	2.37	2.18	2.18	2.26
	GET2102	2.44	2.44	2.44	2.44	2.38
	GET2103	2.29	2.43	2.29	2.29	2.23
	GET2113	1.97	3.00	3.00	3.00	1.84
	GET2107	2.93	2.93	2.93	2.93	2.95
	GET2108	2.87	2.90	2.87	2.87	2.89
	GET2109	3.00	3.00	3.00	3.00	3.00
	GET2119	2.47	2.47	2.47	2.47	2.41
	HUT2101C	2.37	2.38	2.37	2.38	2.37
	Average	**2.50**	**2.66**	**2.62**	**2.62**	**2.48**

Table 2.2.2c: POs attained (Direct) of all courses on a scale of 3, for the academic year 2022-23

	Subject Code	PO1	PO2	PO3	PO4	PSO
Batch 2022-23	GET2120	2.36	2.50	2.13	2.34	2.40
	GET2102	2.93	2.93	3.00	2.93	2.93
	GET2103	2.63	2.60	2.64	2.58	2.63
	GET2129	2.82	2.83	-	2.80	2.83
	GET2113	2.89	3.00	3.00	3.00	2.88
	GET2121	2.83	2.89	2.83	2.92	2.87

	GET2117	2.80	2.83	2.79	2.79	2.80
	GET2108	2.67	2.50	-	2.72	2.69
	GET2124	2.63	2.64	2.69	2.67	2.60
	GET2133	2.45	2.46	2.50	2.50	2.50
	GET2135	2.29	2.29	2.13	2.34	2.29
	Average	**2.66**	**2.68**	**2.63**	**2.69**	**2.67**

Observations on attainment levels for syllabus years 2020-21 and 2021-22

Course Code: GET 2101	**Course Title: Technology and Chemistry of Polymers**	**Credits = 3**		
		L	**T**	**P**
Semester: I	**Total contact hours: 45**	**2**	**1**	**0**
Course Outcomes (students will be able to….)				
1.	Understand basics of polymer chemistry and types of polymerizations	K4		
2.	Classify and compare between various polymers.	K5		
3.	Understand synthesis, properties and applications of various polymers	K3		
4.	Apply effect of polymer morphology on processing conditions	K2		
5.	Explain various additives used in plastics and importance of polymer blends and alloys.	K2		

Course Code: GET 2102	**Course Title: Processing of Plastics**	**Credits = 3**		
		L	**T**	**P**
Semester: I	**Total contact hours: 45**	**2**	**1**	**0**
Course Outcomes (students will be able to….)				
1.	Understand basic principles of Injection Moulding and troubleshooting in Injection Moulding.	**K3**		
2.	Explain extrusion lines for various plastic parts such as profiles, pipes, tubing's, films, sheets and insulation coating on cables.	**K3**		
3.	Compare between compression and transfer moulding process on the basis of process variables.	**K5**		
4.	Understand processing methods such as blow moulding, rotational moulding for hollow articles.	**K3**		
5.	Understand basic principles and applications of calendaring, thermoforming and FRP processes	**K3**		

Course Code: GET 2103	**Course Title: Plastic Product Design and Testing**	**Credits = 3**		
		L	**T**	**P**

Semester: I	Total contact hours: 45	2	1	0
Course Outcomes (students will be able to….)				
1.	Understand basics of plastic product design	K4		
2.	Design engineering plastic products based on technical requirements.	K6		
3.	Understand various test standards for plastic product testing.	K3		
4.	Understand test procedure to evaluate mechanical, electrical, thermal , flow, optical, and general properties for plastic products.	K3		
5.	Analyse and interpret various test results	K4		

Course Code: GET 2113		Course Title: Finite Element Analysis	Credits = 3		
			L	T	P
Semester: I	Elective – II	Total contact hours: 45	2	1	0
Course Outcomes (students will be able to…..)					
1.	Understand the concepts behind formulation methods in FEM.	K2			
2.	Develop element characteristic equation and generation of global equation.	K6			
3.	Relate the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.	K3			
4.	Apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi symmetric and dynamic problems and solve them displacements, stress and strains induced	K3			

Course Code: GET 2107	Course Title: Design of Molds	Credits = 3		
		L	T	P
Semester: II	Total contact hours: 45	2	1	0
Course Outcomes (students will be able to…..)				
1.	Design and draw compression molds for plastic products	K6		
2.	Applying basic principles of design of transfer molds	K3		
3.	Analyze, design and draw Injection molds for plastic products	K4		
4.	Design of extrusion dies	K6		

Course Code: GET 2108	Course Title: Principles of Plastic Processing Machinery Design	Credits = 3		
		L	T	P
Semester: II	Total contact hours: 45	2	1	0

Course Outcomes (students will be able to….)		
1.	Applying basic principles of hydraulics to working of hydraulic machinery	**K3**
2.	Applications of various pumps, valves etc in hydraulic circuit	**K3**
3.	Applications of hydraulic circuits in plastic processing machines	**K3**
4.	Analysis of various design parameters for screw extruder	**K4**
5.	Classifications and applications of clamping system for injection molding	**K4**
6.	Applications of thermal heating and temperature control in plastic processing	**K3**

Course Code: GET 2109	**Course Title: CAD/CAM/CAE**	**Credits = 3**		
		L	**T**	**P**
Semester: II	**Total contact hours: 45**	**2**	**1**	**0**
Course Outcomes (students will be able to….)				
1.	Construct solid models of plastic and mechanical components	K3		
2.	Design various molds and dies using computer-aided design	K6		
3.	Applying the basics of computer-aided manufacturing programme	K3		
4.	Analyse variation in pressure, temperature and time graph using a computer-aided programme	K4		

Course Code: GET 2119		**Course Title: Advanced Polymer based Materials in Engineering applications**	**Credits = 3**		
			L	**T**	**P**
Semester: II	**Elective – III**	**Total contact hours: 45**	**2**	**1**	**0**
Course Outcomes (students will be able to…..)					
1.	Design and analysis of fiber reinforced polymer composites.		K6		
2.	Applications of various methods of manufacturing fiber reinforced polymer composite.		K3		
3.	Applications of performance enhancing and special purpose construction chemicals, polymer modified cement mortars for repairs		K3		
4.	Applications of different types of polymers in manufacturing of pipes for water supply/ wastewater, effluent transport, drainage system.		K3		
5.	Applications of polymers in electrical applications		K3		
6.	Applications of polymer composites in automobile and medical applications		K3		

Course Code: GET 2117	Course Title: Plastic Waste Management	Credits = 3		
		L	T	P
Semester: II	Total contact hours: 45	2	1	0
Course Outcomes (students will be able to…..)				
1.	Analyze sources of plastic waste and separation methods	K4		
2.	Classify various plastic waste management techniques	K4		
3.	Analyze the impact of the effect of various recycling processes	K4		
4.	Analyze the impact of Plastic process industry on the global, economic and societal context	K4		

Course Code: GET 2112		Course Title: Processing and Mechanics of Composites	Credits = 3		
			L	T	P
Semester: I	Elective – I	Total contact hours: 45	2	1	0
Course Outcomes (students will be able to….)					
1.	Analyze polymer composites and factors affecting its performance	K4			
2.	Analyze mechanical properties of polymer composites	K4			
3.	Analyze deformation behaviour of single ply or lamina	K4			
4.	Understand processing and fracture modes of polymer composites	K2			

Observations on attainment levels for each of the POs for syllabus year 2022-23

Course Code: GET 2120	Course Title: Chemistry of Polymers and Plastic Materials	Credits = 3		
		L	T	P
Semester: I	Total contact hours: 45	2	1	0
Course Outcomes (students will be able to….)				
1.	Understand basics of polymer chemistry and types of polymerizations	K2		
2.	Apply properties of polymers/smart polymers/industry-oriented polymers for suitable applications	K3		
3.	Analyze Synthesis of commodity, engineering and specialty plastics	K4		
4.	Apply effect of polymer morphology on processing conditions	K3		
5.	Apply effect of various additives on polymer /polymer blend properties	K3		

Course Code: GET 2102	Course Title: Processing of Plastics	Credits = 3		
		L	T	P
Semester: I	Total contact hours: 45	2	1	0

Course Outcomes (students will be able to….)		
1.	Evaluate the effect of various process parameters of injection molding on plastic products	**K5**
2.	Analyze effect of various parameters on plastic products produced by extrusion	**K4**
3.	Apply the effect of various process parameters of compression molding on product quality	**K3**
4.	Apply principles of blow molding, rotational molding for plastic products.	**K3**
5.	Understand basics of calendaring, thermoforming and FRP process in various applications	**K2**

Course Code: GET 2103	**Course Title: Plastic Product Design and Testing**	**Credits = 3**		
		L	**T**	**P**
Semester: I	**Total contact hours: 45**	**2**	**1**	**0**

Course Outcomes (students will be able to….)		
1.	Analysing basics of plastic product design	**K4**
2.	Design engineering plastic products based on technical requirements	**K6**
3.	Apply various test standards for plastic product testing	**K3**
4.	Applying various test procedure to evaluate mechanical, electrical, thermal, flow, optical, and general properties for plastic product	**K3**

Course Code: GET 2129		**Course Title: Processing and Mechanics of Composites**	**Credits = 3**		
			L	**T**	**P**
Semester: I	**Elective – I**	**Total contact hours: 45**	**2**	**1**	**0**

Course Outcomes (students will be able to….)		
1.	Analyze polymer composites and factors affecting its performance	**K4**
2.	Analyze mechanical properties of polymer composites	**K4**
3.	Analyze deformation behaviour of single ply or lamina	**K4**
4.	Understand processing and fracture modes of polymer composites	**K2**

Course Code: GET 2113		**Course Title: Finite Element Analysis**	**Credits = 3**		
			L	**T**	**P**
Semester: I	**Elective – II**	**Total contact hours: 45**	**2**	**1**	**0**

Course Outcomes (students will be able to…..)		
1.	Understand the concepts behind formulation methods in FEM.	**K2**

2.	Develop element characteristic equation and generation of global equation.	**K6**
3.	Relate the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.	**K3**
4.	apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi symmetric and dynamic problems and solve them displacements, stress and strains induced	**K3**

Course Code: GET 2121/ HUT2101c	**Course Title: Course Title: Research Methodology**	**Credits = 4**		
		L	**T**	**P**
Semester: I	**Total contact hours: 90**	**2**	**0**	**4**
Course Outcomes (students will be able to….)				
1.	Understand the basic concepts of research and the components.	**K2**		
2.	Understand and appreciate the significance of statistics in Plastic, Mechanical, Electrical and Civil Engineering.	**K2**		
3.	Understand and apply importance of literature survey in research design	**K3**		
4.	Understand an in-depth knowledge on the documentation in research	**K2**		
5.	Evaluate importance of various parts of a research report/paper/thesis in presentation of research results	**K4**		
6.	Prepare and deliver a model research presentation	**K5**		
7.	Understand the significance of various types of IPRs in research	**K1**		
8.	Create a model research project	**K6**		

Course Code: GET 2124	**Course Title: Design of Plastic Molds and dies**	**Credits = 3**		
		L	**T**	**P**
Semester: II	**Total contact hours: 45**	**2**	**1**	**0**
Course Outcomes (students will be able to…..)				
1.	Understand the basic factors to be considered in plastic mold design.	**K2**		
2.	Understand and apply importance of mold design factors in mold design calculations.	**K3**		
3.	Understand basic principles of extrusion die design	**K2**		
4.	Design and draw injection, transfer and compression molds.	**K6**		
5.	Understand various injection mold design simulation softwares	**K2**		
6.	Understand various materials used for molds and extrusion dies construction.	**K2**		
7.	Understand concept of 3 D printing	**K2**		

Course Code: GET 2108	Course Title: Principles of Plastic Machinery Design	Credits = 3		
		L	T	P
Semester: II	Total contact hours: 45	2	1	0
Course Outcomes (students will be able to….)				
1.	Evaluate effect of various design parameters on plastic processing	K5		
2.	Analyze effect of various hydraulic devices in plastic processing machinery	K4		
3.	Understand basics of mixers in plastic processing, Understand effect of thermal heating and temperature control in plastic processing.	K2		
4.	Analyze effect of various design parameters for screw extruder.	K4		
5.	Understand classifications and applications of clamping system for injection molding.	K2		

Course Code: GET 2117	Course Title: Plastic Waste Management	Credits = 3		
		L	T	P
Semester: II	Total contact hours: 45	2	1	0
Course Outcomes (students will be able to…..)				
1.	Understand Plastic Waste Management Practices.	K2		
2.	Apply knowledge for plastic resource recovery and circular economy.	K3		
3.	Decide suitability of process for mechanical recycling of plastics.	K5		
4.	Select better option from recycling, incineration and landfilling	K4		
5.	Understand Plastic waste Management rules in India, Global rules and regulations	K2		

Course Code: GET 2133		Course Title: Advanced Polymer based Materials in Engineering applications	Credits = 3		
			L	T	P
Semester: II	Elective – III	Total contact hours: 45	2	1	0
Course Outcomes (students will be able to…..)					
1.	Design and analysis of fiber reinforced polymer composites.	K6			
2.	Applications of performance enhancing and special purpose construction chemicals, polymer modified cement mortars for repairs	K3			
3.	Applications of different types of polymers in manufacturing of pipes for water supply/ wastewater, effluent transport, drainage system.	K3			
4.	Applications of polymers in electrical applications	K3			
5.	Applications of polymer composites in automobile and medical applications	K3			

Course Code: GET 2135		Course Title: Project Management Methodology and Planning	Credits = 3		
			L	T	P
Semester: II	Elective – IV	Total contact hours: 45	2	1	0
Course Outcomes (students will be able to….)					
1.	To develop a critical understanding of project management to enable students to recognize the importance of discipline in a variety of organizational and functioning contexts.		K2		
2.	Students will learn critical understanding of the concepts employed in project management at strategic, system and operational level.		K3, K4		
3.	Students will able to develop knowledge and skills required for implementation in an organization.		K5, K6		

CRITERION- 3	STUDENTS PERFORMANCE	51/75

Item (Information to be provided cumulatively for all the shifts with explicit headings, wherever applicable	CAY (2022-23)	CAYm1 (2021-22)	CAYm2 (2020-21)	CAYm3 (2019-20)	CAYm4 (2018-19)
Sanctioned intake of the program (*N*)	18	18	18	18	10
Total number of students admitted through GATE *(N1)*	0	0	0	1	2
Total number of students admitted through PG Entrance and others *(N2)*	4	11	11	9	6
Total number of students admitted in the Program *(N1 +N2)*	4	11	11	10	8

Table 3.1

CAY – Current Academic Year
CAYm1 – Current Academic Year minus 1 = Current Assessment Year
CAYm2 – Current Academic Year minus 2 = Current Assessment Year minus1
LYG – Last Year Graduate minus 1
LYGm2 – Last Year Graduate minus 2

Year of entry	*N*1 + *N*2 (As defined above)	Number of students who have successfully graduated	
		I Year	II Year
CAY (2022-23)	4		
CAYm1 (2021-22)	11	11	
CAYm2 (2020-21)	11	11	9
CAYm3 (2019-20)	10	10	9
CAYm4 (2018-19)	8	8	8

Table 3.2

3.1. Enrolment Ratio through GATE (20)

(Institute Marks: 0)

Enrolment Ratio= N1 /N; N is sanctioned intake; N1 is a number of students admitted through GATE.

Item (Students enrolled at the First Year Level on average basis during the last three years starting from Current Academic Year)	**Marks**
>=80% students enrolled through GATE	20
>=60% students enrolled through GATE	16
>=50% students enrolled through GATE	12
>=40% students enrolled through GATE	8
>=20% students enrolled through GATE	6
<20% students enrolled through GATE	0

Table 3.1.1

3.2. Success Rate in the stipulated period of the program (20)

(Institute Marks: 18.20)

S.I. = Number of students completing the program in stipulated duration/ Number of students admitted in the first year of the same batch.
Average S.I.= Mean of SI for past 3 Batches
Assessment points = 20 X Average S.I.

	Number of students admitted in first year of same batch (N)	**Number of students completing program in stipulated duration**	**S.I.**
2022-2023	4	-	-
2021-2022	11	-	-
LYG (2020-2021)	11	9	0.82
LYGm1 (2019-2020)	10	9	0.9
LYGm2 (2018-2019)	8	8	1
Average SI			0.91
Assessment Point = 20 x Average S.I.			**0.906*20 = 18.20**

Table 3.2

3.3. Placement, Higher Studies and Entrepreneurship (20)

(Institute Marks 18.13)

Assessment Points = 20 × average placement; N is the total no. of students admitted in the first year

Item	LYG CAYm1 (2021-22)	LYGm1 CAYm2 (2020-21)	LYGm1 CAYm3 (2019-20)
Total No of students admitted in first year (N)	11	10	8
No. of students placed in companies or Government Sector (x)	9	8	7
No. of students pursuing PhD/ JRF/ SRF (y)	0	0	1
No. of students turned entrepreneur in engineering/ technology (z)	0	1	0
x + y + z =	9	9	8
Placement Index: (x + y + z)/N	9/11 = 0.82	9/10 = 0.9	8/8 = 1
Average placement= (P1 + P2 + P3) / 3	0.91		
Assessment Points = 20 × average placement	**=20*0.91 = 18.13**		

Table: 3.3.1

3.3.1a. Provide the placement data in the below-mentioned format with the name of the program and the assessment year:

Assessment Year 2022-23 (CAY)				
Sr. No.	**Name of the student placed**	**Enrollment No.**	**Name of the Employer**	**Appointment letter reference no. with date**
1.	Akshay Shailesh Jain	21PLS202	Bhavi Plast Pvt. Ltd Mumbai	Letter Ref.: 24th May 2023
2.	Ashish Jayant Kulkarni	21PLS203	JJ Plast Alloy Pvt. Ltd.	Letter Ref.: 11th May 2023
3.	Mihir Macchindra Jadhav	21PLS206	JJ Plast Alloy Pvt. Ltd.	Letter Ref.: 3rd May 2023
4.	S Jeya Varshini	21PLS208	Dow Chemicals Pvt. Ltd.	Letter Ref.: 1st July 2023
5.	Sajit Ajithan	21PLS209	Kingfa Science and Technology Pvt. Ltd Pune	Letter Ref: 05th April 2023
6.	Suraj Rajendra Mhaske	21PLS211	Henkel Adhesives Technologies India Pvt Ltd, Navi Mumbai	Letter Ref.: Nil
7.	Vikas Bhausaheb Mhaske	21PLS212	Polyone Polymers India Pvt. Ltd, Ranjan gaon, Pune	Letter Ref.: 25th April 2023

Assessment Year 2021-22 (CAYm1)				
Sr. No.	**Name of the student placed**	**Enrollment No.**	**Name of the Employer**	**Appointment letter reference no. with date**
1.	Dipashree Arun Penkar	20PLS201	Henkel Adhesives Technologies India Pvt Ltd, Navi Mumbai	Letter Ref: 2097 Dt: 14th Nov 2022
2.	Dnyanada Diwakar Chaudhari	20PLS202	Henkel Adhesives Technologies India Pvt Ltd, Navi Mumbai	Letter Ref: 2097 Dt: 14th Nov 2022
3.	Meghna Pratham Humbal	20PLS203	Shree Bhagubai Mafatlal Polytechnic Institute (SBMP), Mumbai	Letter Ref.: Sponsored Candidate
4.	Mehul Sanju Karkar	20PLS204	Kent Engineering India Pvt Ltd	Letter Ref. HR/330/22 Dt: 24th Nov 2022
5.	Prajwal Suresh Ghadekar	20PLS205	Kingfa Science and Technology (India) Ltd	Letter Ref. 17th Dec 2021
6.	Sai Shrikantrao Deshmukh	20PLS206	Brose India Automotive Systems Pvt Ltd,Pune	Letter Ref:29th Sep 2022
7.	Shreyash Vijay Tayde	20PLS207	Kingfa Science and Technology (India) Ltd	Letter Ref: 26th Sep 2022
8.	Deepshikha Katiyar	20PLS208	Kingfa Science and Technology (India) Ltd	Letter Ref: 17th Sep 2022
9.	Tanvi Sanjay Suryawanshi	20PLS211	Polyone Polymers India Pvt Ltd , Bhiwandi .	Letter Ref: 2nd Nov 2022

Assessment Year 2020-21 (CAYm2)				
Sr. No.	**Name of the student placed**	**Enrollment No.**	**Name of the Employer**	**Appointment letter reference no. with date**
1	Akash Valmik Mahajan	19PLS201	FAURECIA India Pvt Ltd, Pune	Letter Ref.: Nil
2	Harshal J. Shatalwar	19PLS202	Entrepreneur (Startup)	Will be updated
3	Jagadish R	19PLS203	Ashirvad Pipes Bengaluru	Letter Dt: 31st May 2023
4	Keyur kumar Sureshbhai Vadaliya	19PLS204	Lexcru Water Tech Pvt Ltd. Ahmedabad	Ref: LEX/ WATERTECH/ 2023/05
5	Mohit Prakash Salunkhe	19PLS205	Capgemini Technology Services India Pvt Ltd, Pune	Letter Ref.: 2nd March 2022
6	Naveen Nitin Tembhurnikar	19PLS206	Shree Bhagubai Mafatlal Polytechnic Institute (SBMP), Mumbai	Letter Ref.: Sponsored Candidate

7	Paras Manojkumar Tholiya	19PLS207	FAURECIA India Pvt Ltd , Pune	Letter Dt:26th April 2022
8	Sachin Anant Kamble	19PLS208	Shree Bhagubai Mafatlal Polytechnic Institute (SBMP), Mumbai	Letter Ref.: Sponsored Candidate
9	Swagata Ray Chaudhury	19PLS211	Sparsh Polychem, Delhi SG Control and Switchgears Gurgaon	Letter Ref.: Nil

Assessment Year 2019-20 (CAYm3)

Sr. No.	Name of the student placed	Enrollment No.	Name of the Employer	Appointment letter reference no. with date
1	Arjun Vidyashankar Koli	18PLS201	Wilson Composites India Ltd, Pune	Letter Ref: 16th September 2021 (Rs. 3.80LPA)
2	Avinash Anil Raut	18PLS202	Higher studies in Canada	Will be updated
3	Vikrant Goswami	18PLS203	Henkel Adhesives Technologies India Pvt Ltd, Navi Mumbai	Letter Ref.: 15th March 2022 (Rs.10.48 LPA)
4	Kamlesh Jakhar	18PLS204	ABLE Design, Hubli, Karnataka	Will be updated
5	Nishant Kumar Datta	18PLS205	Industry Sponsored, TVS Motor Company, Himachal Pradesh	Internally promoted in TVS motor
6	Jaynish Rameshbhai Amipara	18PLS206	Tilara Polyplast, Rajkot	Letter Ref.: 05th May 2019
7	Sanjay Kumar Patel	18PLS207	Asst Prof, Govt Polytechnic, Lucknow	Ref. No.: 911/16/Letter No.-2-2022, Dt.: 24th June 2022
8	Deepak Kumar Sudhanshu	18PLS208	Asst Prof., CIPET, Bhubaneswar	Will be updated

Table 3.1.1a

3.4. Professional Activities (15)

(Institute Marks: 15)

3.4.1. Student's participation in Professional societies/chapters and organizing engineering events (5)

(Institute marks: 5)

- Five-days hands-on training cum workshop on ANSYS simulation software offered by CADFEM- ANSYS Ltd. Pune from 17th April to 21st April 2023 was organised.
- Students are undergoing industrial training for 4 to 6 months in the various industries, to get industrial exposure and to observe professional practices which are been adopted by the industries.
- Students of M.E Plastic Engineering, attended Asia's largest exhibition on plastics, i.e., PlastIndia Exhibition and regularly attending training programs, seminars, and conferences organized by various professional bodies.
- The Vortex program is arranged by Technological association of Institute of Chemical Technology Mumbai. The ME students are actively involved in organizing and participation in such events. The students are getting great exposure of Industry defined problems to be solved as a one of the tasks in a competition.

3.4.2. Student's publications (10)

(Institute marks: 10)

Year 2020-21

1. Optimization of wet sliding wear parameters of Titanium grade 2 and grade 5 bioimplant materials for orthopaedic application using Taguchi method, SG Solanke, VR Gaval, Journal of Metals, Materials and Minerals 30 (3)
2. Designing of Parabolic Trough Solar Concentrator Using Structural Steel, D Biswas, VH Dalvi, SP Deshmukh, SV Panse, JB Joshi, Proceedings of Industry Interactive Innovations in Science, Engineering
3. Assessment of strength of attachment of cotton fibre to seed, VG Arude, SP Deshmukh, SK Shukla, PG Patil, Journal of Cotton Research and Development
4. Single locking cotton feeder for enhancing ginning efficiency of double roller gin, VG Arude, SP Deshmukh, PG Patil, SK Shukla, Farm Machinery Industrial Research Corp. in cooperation with The Shin …
5. Influence of single locking of cotton bolls on ginning performance of double roller gin for short staple cotton, VG Arude, SP Deshmukh, PG Patil, SK Shukla, Journal of Cotton Research and Development
6. To Optimize the Conduct of a Photovoltaic Structure using Different DC-DC Conversion Topologies with Emerging Methods for Control Algorithms, P Kulkarni, S Deshmukh, 2020 International Conference on Convergence to Digital World-Quo Vadis …

7. Air side performance of tube bank of an evaporator in a window air-conditioner by CFD simulation with different circular tubes with uniform transverse pitch variation, PD Souza, D Biswas, SP Deshmukh, International Journal of Thermofluids 3, 100028
8. An overview: Applications of thermal energy storage using phase change materials, SPDeshmukh, Shahid Ali Materials Today: Proceedings 26, 1231–1237
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10. Numerical simulations and optimization of solar air heaters, V. S Korpale, SP Deshmukh, CS Mathpati, VH Dalvi, Applied Thermal Engineering 180, 115744
11. Efficiency Intensification of a Solar Structure and Comparison of PI Controller Based Converter Topologies using MATLAB SIMULINK, PA Kulkarni, SP Deshmukh, 2020 IEEE International Conference for Innovation in Technology (INOCON), 1-7
12. Computational fluid dynamics of dual fluidized bed gasifiers for syngas production: Cold flow studies, N Hanchate, VS Korpale, CS Mathpati, SP Deshmukh, VH Dalvi Journal of the Taiwan Institute of Chemical Engineers 117, 156-163
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14. Quality improvement through soil stratum in non-mechanized treatment system for wastewater, SM Gawande, DD Sarode, ICRRM 2019–System Reliability, Quality Control, Safety, Maintenance and Management: Applications to Civil, Mechanical and Chemical Engineering, pg 21-27,2021
15. Effect of Biochar on Soybean yield and Soil Properties in Semi-arid Vertisol., RS Oak, DD Sarode, JB Joshi, SA Chavan, Journal of Plant Science Research 36
16. Effect of biochar on growth and yield of soybean, RS Oak, DD Sarode, JB Joshi, SA Chavan, SS More, VG Salvi, BIOINFOLET-A Quarterly Journal of Life Sciences 17 (2), 255-263
17. A Water Resistant Phosphogypsum Composition Dukb , Dr D D Sarode, Dr P R Nemade, Dr V H Dalvi, Dr Sharad Sontakk, Rahul S,IN Patent 336,119, Journal of Cotton Research and Development.
18. Preparation of low-density polyethylene–silver ion antimicrobial film with and without ethylene-vinyl acetate, RSN Sahai, VR Gaval, B Bhat, Polymers and Polymer Composites 28 (8-9), 554-561.
19. Overview of generation of electricity using tidal energy, 2020 2020 IEEE First International Conference on Smart Technologies for Power, Energy and Control (STPEC), 1-6
20. AI based sustainable approach for metal extraction from e-waste: a comprehensive literature review, S Choubey, P Goswami, S Gautam, 2020 3rd International Conference on Intelligent Sustainable Systems (ICISS), 1445-1449
21. Review on Energy Management Systems for Hybrid E Vehicles, Vaishali A Katkar, Prerna Goswami, 2020, International Conference on Power, Energy, Control and Transmission Systems (ICPECTS),1-6.

22. Solar-Aided Coal Fired Power Generation-A review, Satish Ghorpade, Prerna Goswami, 2020 International Conference on Power, Energy, Control and Transmission Systems (ICPECTS),1-11
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2. Effect of Water Absorption on the Mechanical Properties of Wheat Straw Fibre Reinforced Polystyrene Composites, R.S.N Sahai, Ankita Shinde, Deepankar Biswas and Asit B. Samui, 2022, ASM Sc. J., 17, 1-8
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18. Impact of co-application of biomethanated spent wash with bio-char on soil micronutrients and crop growth, RS Oak, DD Sarode, JB Joshi, SA Chavan, Society for Sugarcane Research and Development
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6. CC-LA: determining optimal switching angles in a cascaded H-bridge multilevel inverter with the aid of binary cat cubpool-based lion algorithm, P Jain, SP Deshmukh, Environmental Science and Pollution Research 29 (9), 12399-12413

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Prof. (Dr.) Vivek R. Gaval	Prof. (Dr.) Suresh Pandurang	Prof. (Dr.) Dilip Dhondu Sarode	Name of the Faculty Member	
Ph.D. (Tech)	Ph. D. (Tech.)	Ph.D.	**Degree (highest degree)**	Qualification
Mumbai	Mumbai University	Indian Institute of Technology,	**University**	
2012	2009	2010	**Years of graduation**	
31yrs 4 months	26 yrs	25 yrs 11 moths	**Association with the Institution**	
Professor in General Engineering (CAS)	Professor	Professor	**Designation**	
01-07-2013	01-01-2012	01-03-2014	**The date on which Designated as**	
06-06-1992	13-05-1997	12-06-1997	**Date of Joining the Institution**	
General Engineering	Department of General Engineering	Department of General Engineering	**Department**	
Plastic Engineering	Mechanical, Plastic Engineering	Civil Engineering	**Specialization**	
30	35	14	**Research Paper Publications**	Academic Research
Guided: 04, Ongoing: 12	Guided: 07, Ongoing: 12	Guided: 02, Ongoing: 08	**Ph.D. Guidance**	
N/A	N/A	N/A	**Faculty Receiving Ph.D. during Assessment Years**	
Yes	Yes	Yes	**Currently Associated (Y/N) Date of leaving (in case of Currently**	
Regular	Regular	Regular	**Nature of Association (Regular/Contract)**	

Dr. Deepankar B. Biswas	Dr. Vikramsinha S. Korpale	Dr. Prerna Goswami	Dr. R.S.N. Sahai	Shri. Kerawalla Mohd. Amin K.
PhD.	PhD.	Ph.D.	Ph.D.	Master’ s in electrical engineering
ICT, Mumbai	ICT, Mumbai	ICT, Mumbai	Mumbai	University of Bombay (Mumbai)
2020	2021	2018	2013	1985
3 yrs 6 months	3 yrs 6 months	24 yrs 11 months	24 yrs 7 months	36yrs 3 months
Assistant Professor	Assistant Professor	Associate Professor	Professor	Associate Professor in General Engg.
N.A.	N.A.	08-02-2014	22-02-2013	12-03-1996
08th Jan 2020	08th Jan 2020	06-06-1998	17-10-1998	14-02-1987
Department of General Engineering	Department of General Engineering	General Engineering	General Engineering	General Engineering
Solar Thermal energy, Polymer composites	Plastic Product Design, Heat transfer	Electrical Engineering	Plastic Engineering	Electrical Power Systems
08	05	27	17	12
N.A.	N.A.	Guided: 0, Ongoing: 13	Guided: 0, Ongoing: 04	Nil
Yes (2021)	Yes (2021)	Yes (2018)	NO	N.A.
Yes	Yes	Yes	yes	No (31-03-2023)
Contract	Contract	Regular	Regular	Regular

4.1. Student-Faculty Ratio (SFR) (10)

(Institute Marks: 10)

(To be calculated at Department Level)

No. of UG Programs in the Department (n): ____NA_____
No. of PG Programs in the Department (m): ____01_____
No. of Students in UG 2nd Year= **u1**
No. of Students in UG 3rd Year= **u2**
No. of Students in UG 4th Year= **u3**
No. of Students in PG 1st Year= **p1**
No. of Students in PG 2nd Year= **p2**

No. of Students = Sanctioned Intake + Actual admitted lateral entry students
(The above data to be provided considering all the UG and PG programs of the department)

S=Number of Students in the Department = UG1 + UG2 +.. +UGn +PG1 + …PGm
F = Total Number of Regular Faculty Members in the Department (excluding the first-year faculty)

Student-Teacher Ratio (STR) = S/F

Course	Year	2020-21	2021-22	2022-23
M.E (Plastic Engineering)	p1	11	11	4
	p2	10	11	11
	PG	**21** (p1+p2)	**22** (p1+p2)	**15** (p1+p2)
	Total No. of Students in the Department **(S)**	**21** (PG=**S1**)	**22** (PG=**S2)**	**15** (PG=**S3**)
	No. of Faculty in the Department **(F)**	**8** (F1)	**7** (F2)	**7** (F3)
	Student Faculty Ratio (SFR)	**2.63** (SFR1=S1/F1)	**3.14** (SFR2= S2/F2)	**2.14** (SFR3= S3/F3)
	Average SFR	**SFR=** (SFR1+SFR2+SFR3)/3 **= 2.64**		

Table 4.1

Marks to be given proportionally from a maximum of 10 to a minimum of 05 for average SFR between 15:1 to 25:1, and zero for average SFR higher than 25:1. Marks distribution is given as below:

< = 15 - 10 Marks
< = 17 - 09 Marks
< = 19 - 08 Marks
< = 21 - 07 Marks
< = 23 - 06 Marks
< = 25 - 05 Marks
>25.0 - 0 Marks

4.1.1. Provide the information about the regular and contractual faculty as per the format mentioned below:

	Total number of regular faculty in the department	Total number of contractual faculty in the department
CAY (2022-23)	6	2
CAYm1 (2021-22)	6	2
CAYm2 (2020-21)	6	2

Table 4.1.1

4.2. Faculty competencies in the area of Program specialization (30)

(Institute Marks: 30)

(*Relevant faculty information, in the area of Program specialization)*

4.2.1. Faculty name and specialization for the program under consideration (10)

(Institute Marks: 10)

Name of the Faculty	Relevant Area of Specialization	
	CAY 2022-23	**CAYm1 2021-22**
Prof. D. D. Sarode	Concrete Technology Construction Chemicals - Risk Analysis and its mitigation. Recycling of wastes. Recycling of agricultural waste and improving soil fertility	Concrete Technology – Performance Enhancing Construction Chemicals Plasticizers, Superplasticizers, VMA. Risk Analysis and its mitigation. Recycling of wastes. Recycling of agricultural waste and improving soil fertility
Prof. S.P. Deshmukh	Polymeric Composites, Engineering Materials, Plastic Processing, Design of Molds, Analysis of Plastic component using CAD, CAE tools. Solar Hybrid Energy, Refrigeration Air Conditioning, Heat Transfer	Polymeric Composites, Engineering Materials, Plastic Processing, Design of Molds, Analysis of Plastic component using CAD, CAE tools. Solar Hybrid Energy, Refrigeration Air Conditioning, Heat Transfer through the microchannel.
Prof. V. R. Gaval	Particulate filled polymer composites, conversion of Metal parts into plastic using design software's, Tribology, Mold flow analysis	Particulate filled polymer composites, conversion of Metal parts into the plastic using Design soft wares
Shri. M.A.K. Kerawalla	Electrical Power System, Power Electronics, Power Control	Electrical Power System, Power Electronics, Power Control
Dr. R.S.N. Sahai	Polymer Composites , Nanocomposites and its applications in Mechanical	Polymer Composites, Mould Design, Thermal Engineering

	Engineering, Mould design, Energy Engineering.	
Dr. Prerna Goswami	Sustainable Energy and MATLAB simulations	Sustainable Energy, MATLAB simulations, Electrical Engineering
Dr. S. T. Mhaske	Rheological of polymers, Nanoparticle Synthesis, Impact Modification of Polymers, Development of Thermoplastics Vulcanizates, Development of Resins from renewable Sources, Synthesis of Polyamide based Hot Melt Adhesives, Functional Modification of Resin for coating Application, Development of Water-based or VOC free Coatings for Industrial Applications.	Polymer Composites, Cellulose based nanoparticles and whiskers, Bio Nanocomposites, Conductive coatings
Dr. Vikramsinha S. Korpale	Thermal design of equipment, Plastic products design and analysis, computational fluid dynamics, Equipment design and analysis, powder-flow equipment designs.	Thermal design of equipment, Plastic products design and analysis, computational fluid dynamics, Equipment design and analysis, powder-flow equipment designs.
Dr. Deepankar B. Biswas	Renewable energy, Solar Thermal, Heat Exchanger, Heat Transfer, Polymer composites	Renewable energy, Solar Thermal, Heat Exchanger, Heat Transfer, Polymer composites

Table 4.2.1.1

4.2.2. Faculty Research Publication (10)

(Institute Marks: 10)

Name of the Faculty	Academic Research					
	Number of quality publications in refereed/ SCI Journals, citation, Books/ Book Chapters etc.			Ph.D. guided / Ph.D. awarded during the assessment period while working in the institute		
	CAYm1 2021-22	CAYm2 2020-21	CAYm3 2019-20	CAYm1 2021-22	CAYm2 2020-21	CAYm3 2019-20
Prof. D. D. Sarode	3	4	-	1	1	-
Prof. S.P. Deshmukh	1	11	2	-	2	1
Prof. V. R. Gaval	12	2	-	2	1	-
Shri. M.A.K. Kerawalla	-	-	-	-	-	-
Dr. R.S.N. Sahai	2	1	-	-	-	-

Dr. Prerna Goswami	-	4	1	-	-	-
Dr. Vikramsinha S. Korpale	1	2	-	-	-	-
Dr. Deepankar B. Biswas	-	3	-	-	-	-

Table 4.2.2.1

4.2.3. Faculty Development work (10)

(Institute Marks: 10)

The faculty members in the department are extremely hard working. The faculties have pursued their Ph.D.'s in the relevant field of their research which in turn helps the department in their curriculum. The faculties also undergo various FDP's and STTP's for improvement of the subject knowledge and improve the teaching methodology.

The department also runs various Ph.D. programs in Civil, Mechanical, Electrical and Electronics and many external candidates have registered for Ph.D. under the faculties of the department. Presently 55+ Research Scholars are there in the department. Only 7 are working full-time whereas the remaining are part-time candidates.

Name of Faculty	Nos. of Research Scholars	Nos. of M E Students
Prof. D. D. Sarode	08	7
Prof. S.P. Deshmukh	15	2
Prof. V. R. Gaval	12	7
Shri. M.A.K. Kerawalla	-	-
Dr. R.S.N. Sahai	10	7
Dr. Prerna Goswami	11	-
Dr. S. T. Mhaske	17	-

Prof D D Sarode has received a project grant of Rs. 1.98 Crores from DST, Government of India. This project is for mitigation of water problems in the drought prone Marathwada region at Taluka Ausa in Latur District. This project involves the setting of R O unit, effective recycling of water, Reject water management, Rejuvenation of Lake, Wastewater treatment unit and construction of wastewater treatment unit. From this funding an Environmental Laboratory is set up in the department. Prof D D Sarode also set up a Cement Composites laboratory in the department which helps students to understand the effect of polymer-based construction chemicals used to improve the performance of cement composites.

The following patents are filed by the faculty of the department-

1. Title: System for continuous extraction of pure water from feeds with resaturation and reuse of draw (Application No.: PCT/IN2019/050875)

2. Patent on lifting device filed in 2017 and design is registered (Design No 302238 dated 8/2/2018) in the name of Sangit Kadu, Dr Vivek Gaval, Sachin Solanke in the Government of India, Patent office.
3. Patent filled in 2014 on "A water-resistant Phoshpogypsum composition", (Application no. 4024/MUM/2014) by Dr. Dilip D Sarode and Dr. Parag R. Nemade in Government of India patent, Evaluation report received in September 2019.

4.3. Faculty as participants in Faculty development/ training activities/ STTPs (5)

(Institute Marks: 5)

The department faculties have attended various training programs from 2018 to 2023, as listed below-

Prof. D.D. Sarode		
Programme Details	**Description**	**Date**
TEQIP short term training program on "Fly Ash Management for Thermal Power Plants"	The technic of fly ash disposal and application were discussed in this program	22-05-2018 to 25-05-2018
Prof. V. R. Gaval		
Programme Details	**Description**	**Date**
"5-day online FDP on DEEKSHARAMBH (Student Induction Program)"	The introduction of courses to the new students was discussed in the course	10-08-2020 to 14-08-2020
Dr. R.S.Sahai		
Programme Details	**Description**	**Date**
Introduction to Composites (FDP) NPTEL	The composite material properties and new processing methods were discussed in this particular course	12 weeks (September to November 2020)
Heat Exchanger: Fundamentals and Design Analysis (FDP) NPTEL	The heat exchanger thermal and structural design were discussed in this course.	12weeks (September to November 2020)
Transforming Pedagogy in India, NIT Jamshedpur	The writing skills beneficial for teaching was discussed in this course.	01-08-2020 to 03-08-2020
Shifting Teaching-Learning Paradigms through Innovative Pedagogy at V.J.T.I. Mumbai	The innovative methods of pedagogy were discussed in this course.	09-12-2019 to 14-12-2019
Dr. Prerna Goswami		

Programme Details	Description	Date
AICTE Training And Learning (ATAL) Academy FDP on 'Recent Trends in Renewable Energy'	The teaching and learning methodology was fully preseented in the course so as to ease the daily lectures to the institute students	31 January 2022 to 04 February 2022
NPTEL: 8 weeks Online certification course on Solar Photovoltaic: Principles, Technologies & Material	The newer technologies, the basics and advanced materials for the manufacturing of solar photovoltaics were discussed in the FDP	31 January 2022 to 27 March 2022
Dr. Vikramsinha S. Korpale		
Programme Details	**Description**	**Date**
Certificate Course on early-stage Technology Commercialization organized by TECHEX.IN, A TECH TRANSFER HUB AT VENTURE CENTER, Supported by Biotechnology Industry Research Assistance Council (BIRAC), Department of Biotechnology, GOI	The technology commercialization and entrepreneurship activities were discussed in the course	1 Feb 2021 to 8th Mar 2021
Machine Learning Advanced Certification Training conducted by Simplilearn Ltd. Banglore	The data analysis and machine learning technique and related research were discussed in the course.	One-month Self-paced course, issued date was 31st March 2021
Dr. Deepankar B. Biswas		
Programme Details	**Description**	**Date**
FDP "Virtual Experiments in Mechanical Engineering" organised by IIT-Guwahati	The virtual laboratories were demonstrated in the field of Mechanical Engineering	02-11-2020 to 06-11-2020
(ATAL) Academy Online FDP on "Design Thinking" f	The design thinking and product development was discussed in this course	30-09-2020 to 04-10-2020
(ATAL) Academy Online FDP on "Computational Fluid Dynamics"	The computational design of different technologies was taught in this particular course	21-09-2020 to 25-09-2020
5 weeks FDP Course on “Basics of Finite Element Analysis-I”, conducted by SWAYAM-NPTEL	The finite element analysis of different technologies was taught in this particular course	14-09-2020 to 18-10-2020
FDP course on “Product Design and Development”, conducted by SWAYAM-NPTEL	The industrial product design technologies were discussed in this course	14-09-2020 to 18-10-2020

The from the department different were also involved in many other program related activities as mentioned below: -

Prof. D.D.Sarode		
Programme Details	**Description**	**Date**
"Water Security with Responsible Care: Project Case Study of Ausa, Latur under WTI as Invited Speaker in India International Science Festival 2020 (IISF 2020) organised by Ministry of Science and Technology, Ministry of Earth Sciences, Master of Health and Family welfare of Government of India in collaboration with CSIR GOI	The invited talk was delivered about water scarity with responsible care for conservation of valuable water resource	20th Dec 2020 to 25th Dec 2023
Industry Oriented Syllabus Framing" in a Workshop On Curriculum Development with Learner Centric Approach oragnised by Mahatma Education Society's Pillai College of Engineering, New Panvel	The syllabus framing activity was conducted in the particular workshop	10th Jun 2021 to 14th Jun 2021
"Use of Biotechnology for Improving the properties of Materials" at National Conference on Recent Advances in Material Science and Technology at Government College of Engineering, Keonjhar, Odisha.	The member of organizing committee and also delivered a talk about improving material properties	30th and 31st March 2019
TEQIP Major Twinning activity of ICT Mumbai and twinning partner Government College of Engineering Keonjhar Odisha, about the Research and development insight	The first joint meeting was held for interaction with the faculties and Research and development work	2nd Sep 2018 to 4th Sep 2018
TEQIP Major Twinning activity of ICT Mumbai and twinning partner Government College of Engineering Keonjhar Odisha, about long tearm planning and outcome-based education	The second joint meeting was organized for discussion of long-term planning for the Government College of Engineering Keonjhar and outcome based teachning and learning methods	1st Oct 2018 to 4th Oct 2018
Seminar on Application of Metallurgy and Coatings with Lecture by Prof. D.D. Sarode, Dr. A.S. Sabnis and Mrs. K.V. Marathe	Organized the seminar on Application of Metallurgy and Coatings at Government College of Engineering Keonjhar	5th Feb 2019

Technical writing and consultancy advice to faculty members of Government College of Engineering Keonjhar	Organized and delivered a talk on ICT consultancy model, writing funding proposal and execution	5th Feb 2019
Use of Biotechnology for improving the properties of materials at National conference on Recent advances in Material science and Technology at Government College of Engineering Keonjhar Odisha	Keynote address was focusing on sustainable use of Concrete technology and further alternative materials which support sustainable development goal	30th and 31st March 2019
International conference on Environmental Sustainability (ICES 2023) as the part of Centenary Year of VJTI Mumbai	The talk was delivered on sustainability and sustainable materials	16th March 2023 to 17th March 2023
Dr. V.R. Gaval		
Programme Details	**Description**	**Date**
13th International E conference on advancements in Polymeric Materials (APM2022) organised by CIPET, Chennai	Invited lecture and session chair in conference probing innovative and sustainable product design and manufacturing. The lecture delivered on advancement in warpage predictions accuracy for glass filled thermoplastics using integrative simulation approach.	8th March 2022 to 12th March 2022.
Attended Meetings of International Committee of the Mold Technologies Division of SPE in the year 2021	Invited member of a meeting at Society of Plastic Engineers	14th April 2021
Dr. R.S. Sahai		
Programme Details	**Description**	**Date**
National conference on Advances in Mechanical Engineering at Government College of Engineering Keonjhar Odisha	Organized the conference alongwith Prof. Amit Pratap of Department of Oils discussing recent trends in Tribology and lubrication	26th Feb 2019

4.4. Research and Development (30)

(Institute Marks: 30)

The department of General Engineering curriculum is designed in a such a way to support the research and development activities by the students and faculties. The research funding is received by various government organizations as well as free industrial market organizations. The details of sponsored research projects and consultancies are mentioned below. The faculties of the department work on novel research projects. The patents filed and granted as an outcome of the novel R &D are mentioned below in this section.

4.4.1. Sponsored Research (15)

(Institute Marks: 15)

Sponsored Research

Year 2021-22 (CAYm1)

Sr. No.	Student Name	M.E / Ph.D.	Project Title	Duration	Funding Agency	Amount (in Rupees) (lakhs)
1.	Rohan Oak	Ph.D. Civil	Application of biochar for agriculture production under different agro-climatic conditions	5 years	Marathi Vidnyan Parishad	Rs. 22.5
2.	Ameya Kulkarni	Ph.D. Mechanical	Design and Scale-up of Dryer for Processing grapes to Raisins	5 years	Marathi Vidnyan Parishad	Rs. 10.0
3.	Punit Gharat	Ph.D. Mechanical	Development of solar thermal technologies for substituting fossil fuels for medium temperature applications.	5 years	Marathi Vidnyan Parishad	Rs. 15.0
4.	Ganesh Vitthal Jadhav	Ph.D. Mechanical	Investigation of weld-line strength for Polyamide-6 materials through experimental and simulation methods	5 years	BASF Chemicals Ltd.	Approx Rs. 7.0

Year 2020-21 (CAYm2)

Sr. No.	**Student Name**	**M.E / Ph.D.**	**Project Title**	**Duration**	**Funding Agency**	**Amount (in Rupees) (lakhs)**
1.	Mahesh Dnyandev Divekar	Ph.D. Mechanical	Improvement of warpage prediction through integrative simulation	2 years	BASF Chemicals Ltd.	Approx Rs. 6.5

			approach for thermoplastic material			
2.	Ganesh Vitthal Jadhav	Ph.D. Mechanical	Investigation of weld-line strength for Polyamide-6 materials through experimental and simulation methods	5 years	BASF Chemicals Ltd.	Approx Rs. 7.0
3.	Nishant Kumar Dutta	M.E.	Development of superior scratch resistance 2K clearcoat with paradigm shift for the properties consisting of flexibility, impact, and recoat-ability.	2 years	TVS Motors	Rs. 6.0
4.	Rohan Oak	Ph.D. Civil	Application of biochar for agriculture production under different agro-climatic conditions	5 years	Marathi Vidnyan Parishad	Rs. 22.5
5.	Ameya Kulkarni	Ph.D. Mechanical	Design and Scale-up of Dryer for Processing grapes to Raisins	5 years	Marathi Vidnyan Parishad	Rs. 10.0
6.	Punit Gharat	Ph.D. Mechanical	Development of solar thermal technologies for substituting fossil fuels for medium temperature applications.	5 years	Marathi Vidnyan Parishad	Rs. 15.0

Year 2019-20 (CAYm3)

Sr. No.	Student Name	M.E / Ph.D.	Project Title	Duration	Funding Agency	Amount (in Rupees) (lakhs)
1.	Deepankar Biswas	Ph.D. Mechanical	Design and Optimization of Concentrated Solar Thermal Systems	5 years	Marathi Vidnyan Parishad	Rs. 22.5
2.	Rohan Oak	Ph.D. Civil	Application of biochar for agriculture production un-der different agro-climatic conditions	5 years	Marathi Vidnyan Parishad	Rs. 22.5
3.	Ameya Kulkarni	Ph.D. Mechanical	Design and Scale-up of Dryer for Processing grapes to Raisins	5 years	Marathi Vidnyan Parishad	Rs. 10.0

4.	Punit Gharat	Ph.D. Mechanical	Development of solar thermal technologies for substituting fossil fuels for medium temperature applications.	5 years	Marathi Vidnyan Parishad	Rs. 15.0
5.	Mahesh Dnyandev Divekar	Ph.D. Mechanical	Improvement of warpage prediction through integrative simulation approach for thermoplastic material	2 years	BASF Chemicals Ltd.	Rs. 6.5
6.	Nishant Kumar Dutta	M.E.	Development of superior scratch resistance 2K clearcoat with paradigm shift for the properties consisting of flexibility, impact, and recoat-ability.	2 years	TVS Motors	Rs. 6.0

Research Projects Sanctioned

1. Pilot Study and Evaluation of Production of Green Surfactants from Non-edible/Edible Oils and Treated Oil Seed Meals" sponsored by Rajiv Gandhi Science & Technology Commission (Project Sanctioned cost - 2.2 crore rupees) successfully completed by Prof. V.R.Gaval from April 2018 and submitted final report in February 2023. (Duration 3 years)
2. Processing and Compounding of plastics (Project cost Rs. 9.6 lakhs) sponsored by Varad Vinayak Enterprises, Mumbai, for duration of 3 years, starting from the date 23rd October 2021.

Patent

1. Patent filled in 2019 on "**System for continuous extraction of pure water from feeds with heat resaturation and reuse of draw"**, (Application no. PCT/IN2019/050875) by Dr. Dilip D Sarode in Government of India patent, Evaluation report received on 29 November 2019.
2. Patent filled in 2014 on "**A water resistant Phoshpogypsum composition**", (Application no. 4024/MUM/2014) by Dr. Dilip D Sarode and Dr. Parag R. Nemade in Government of India patent, Evaluation report received in September 2019.
3. Patent on **lifting device** filed in 2017 and design is registered (Design No 302238 dated 8/2/2018) in the name of SangitKadu, Dr VivekGaval, Sachin Solanke in the Government of India, Patent office.

4.4.2. Consultancy (from Industry) (15)

(Institute Marks: 0)

Considering faculty members contributing to the program:
(Provide a list with Project Title, Funding Agency, Amount and Duration)

Funding Amount (Cumulative for CAYm1, CAYm2 and CAYm3):

Amount >10 Lacs	15 Marks,
Amount <10 and >8 Lacs	10 Marks,

Amount <8 and > 6 Lacs	8 Marks,
Amount <6 and >4 Lacs	5 Marks,
Amount <4 and >2 Lacs	2 Marks,
Amount <2 Lacs	0 Marks

A list of consultancy projects and grants received by department faculties is mentioned below-

Year 2022-23 (CAY)

Sr. No.	Faculty Name	Project Title	Duration	Funding Agency	Amount (in Rupees) (in Lakhs)
1.	Dr. V.S. Korpale	A Technical support for equipment design	1.5 years	Zoetis Pharmaceutical Research Ltd. Turbhe Navin Mumbai.	Rs. 9.75
2.	Dr. V.S. Korpale	A technical support in terms of simulation activity for equipment design	1 year	Amar Equipment Pvt. Ltd Bhandup Mumbai	Rs. 6.0

Year 2021-22 (CAYm1)

Sr. No.	Faculty Name	Project Title	Duration	Funding Agency	Amount (in Rupees) (in Lakhs)
1.	Nil	Nil	Nil	Nil	Nil

Year 2021-22 (CAYm2)

Sr. No.	Faculty Name	Project Title	Duration	Funding Agency	Amount (in Rupees) (in Lakhs)
1.	Nil	Nil	Nil	Nil	Nil

Year 2021-22 (CAYm3)

Sr. No.	Faculty Name	Project Title	Duration	Funding Agency	Amount (in Rupees) (in Lakhs)
1.	Nil	Nil	Nil	Nil	Nil

CRITERION 5	LABORATORIES AND RESEARCH FACILITIES	75/75

5.1. Adequate and well-equipped laboratories in area of Program specialization (30)

(Institute Marks: 30)

Sr. No.	Name of Laboratory	Specialized Equipment Name/ Software	Equipment details	Utilization details from the perspective of PO attainment
1.	Processing Lab	Twin Screw extruder	D22 mm CD co-rotating Twin Screw Extruder with Pelletizer	PO5
2.	Processing Lab	Injection molding machine	Injection molding machine microprocessor-based, fully automatic screw type 30 gm shot capacity, 30 T clamping force	PO5
3.	Processing Lab	Compression Testing machine	2500 kN with digital display	PO5
4.	Processing Lab	Blow Moulding machine	Blow Moulding machine vertical screw type having horizontal clamping of one litre	PO5
5.	Processing Lab	Rotational moulding machine	Laboratory scale equipment (fabricated by Ph.D. student in GE workshop)	PO5
6.	Processing Lab	Plastic granules mixing machine	Capacity- 2Kg, Drive: Electrical gear motor with output rpm less than 40	PO5
7.	Processing Lab	Hot Air Oven	Capacity: 2 to 3Kg Polymer granules Temperature range: ambient to 250^0C+/- 0.5^0C	PO5
8.	Testing Lab	Melt flow index testing equipment	Melt flow index testing equipment as per ASTM D 1236 / IS / BIS standards along with accessories & weight	PO3
9.	Testing Lab	Impact test equipment comp Izod Impact Tester	Impact test equipment comp. Izod Impact Tester	PO3
10.	Testing Lab	HDT / VST Apparatus	HDT / VST Apparatus	PO3
11.	Testing Lab	Hardness testing equipment	Hardness testing equipment durameter model DSHT II range 0 to 100 shore unit least count – 1 shore unit.	PO3

12.	Testing Lab	Universal Testing Machine	Consists of two separate load cells viz. for films and plastic dumbbell samples. ASTMD638	PO3
13.	CAD/CAM Lab	Altair Hyperworks CAE	125 Units Research Bundle with Unlimited Nodes	PO4
14.	CAD/CAM Lab	Workstation Computer	Intel i7-8th Gen, 16GB RAM, 250GB SSD, 1TB HDD, 2GB Graphics, Win10	PO4
15.	CAD/CAM Lab	MiniTab 18	Statistical analysis software. DOE optimization and quality management	PO4
16.	CAD/CAM Lab	NX-Unigraphics	CAD CAM software by SIEMENS for CAD Design, NX Tooling, Mold wizard	PO4
17.	CAD/CAM Lab	Moldex3D	Mold Design Software, Educational Perpetuity: Professional – Generic Solution/Project/Designer/Designer BLM/ MDE/ MFE/ Flow/Pack/Cool/Warp/3D Coolant CFD	PO4

Table 5.1.1

5.2. Research facilities/center of excellence (30)

(Institute Marks: 30)

Sr. No.	Name of Facility	Specialized Equipment Name	Equipment details	Utilization details from the perspective of PO attainment
1.	3D Printing	3D Printer	3D Prototype Printer, FDM/ FFF Wanhao Duplicator-6 Plus; DLP Resin Wanhao Duplicator-7	PO4
2.	Optimization Software	Optimization Software	Statistical Module	PO4
3.	Altair Hyperworks CAE	Altair Hyperworks CAE	125 Units Research Bundle with Unlimited Nodes	PO4
4.	Workstation Computer	Workstation Computer	Intel i7-8th Gen, 16GB RAM, 250GB SSD, 1TB HDD, 2GB Graphics, Win10	PO4
5.	Minitab 18	Minitab 18	Statistical Module	PO4
6.	NX-Unigraphics	NX-Unigraphics	CAD CAM software by SIEMENS for CAD Design, NX Tooling, Mold wizard	PO4
7.	Moldex3D	Moldex3D	Mold Design Software, Educational Perpetuity: Professional – Generic Solution/ Project/ Designer/ Designer BLM/ MDE/ MFE/ Flow/ Pack/ Cool/ Warp/ 3D Coolant CFD	PO4

8.	AutoCAD Software	AutoCAD Software	Drawing, Modelling and layout preparation of parts	PO4

Table 5.2.1

5.3. Access to laboratory facilities, training in the use of equipment (15)

(Institute Marks: 15)

Date	Description
April 17th to April 21st, 2023	Five-day hands-on training cum workshop on ANSYS Simulation software was organised for all the M.E and Ph.D. Scholars of the department.

Table 5.3.1

Most of the inhouse facilities are covered during the practicals of the course content. For postgraduate students, freedom is there to use the facilities after office hours with prior permission from the laboratory incharge and Head of the department.

Name of the laboratory	Laboratory Incharge
Processing Lab	Prof V R Gaval
Testing Lab	Dr. R S N Sahai and Dr. Deepankar Biswas
CAD/CAM/CAE	Prof S P Deshmukh and Dr Deepankar Biswas
Cement Composites	Prof D D Sarode

Table 5.3.2

Students are also using advanced software available in the CAD/CAE laboratory for simulation and product design for their project work and understanding. Exposure to new technology such as Rapid Prototyping (3D Printing technology), in CAD/CAE laboratory, helps students in understanding new developments in plastic industries. Students are also acceding the testing facilities present in the laboratory to prepare polymer composites and carrying out its characterization by using the existing laboratory facility for their research project. For other specialized equipment such as for characterization of materials, specialized training is organized at the institute level. Some students visit the facilities to understand more about specialized test machinery. For some advance testing and processing facilities from the Department of Polymer and Surface Engineering are available to our students. SEM facility from the Department of Chemical Engineering is used by students. Mutual interaction with Ph.D. students sometimes is useful to know more about the sampling, test methodology and interpretation of results. Students are aware of some of the central facilities in ICT and other educational and research institutes/organizations such as IIT Bombay, CIRCOT, BTRA. Specialized tests can be done by using the funds from the contingencies or from TEQIP-III or from the Departmental consumables grant. Most of the students handle these testing machines during there inplant training.

CRITERION-6	CONTINUOUS IMPROVEMENT	70/75

6.1. Actions are taken based on the results of the evaluation of each of the POs (25)

(Institute Marks: 25)

Based on suggestions from the experts from the industry, feedback from pass out students, experts from reputed institute following actions were taken:

1. Based on the feedback obtained from alumni and opinion of Department of General Engineering BOS members course on Plastic waste management has been converted to core course with some important additions in the previous one. This course was offered to students as programme elective in the previous syllabus. Converting this course to core was necessary with new government regulations with regards to environment pollution and plastic waste management.
2. Department decided to offer Research Methodology course as mandatory with added practical component and four credits. Earlier this course was offered as an elective with only theory part and 3 credits. The syllabus was designed keeping in mind research required for Plastic Engineering students and Ph.D. students working in the department.
3. Based on the feedback obtained from alumni and opinion of Department of General Engineering BOS members, additions have been done in almost all the courses with regards to latest trends in plastic industries and expectations from our students by the industries.
4. Electives such as Processing and Mechanics of composites, Modelling and simulation of polymer rheology, six sigma and statistics for industrial process improvement, total quality management and project management methodology and planning were added in the new syllabus as per the feedback obtained from our alumni and industry experts. All these courses are significant from an industry point of view.
5. Invited Dr. M.B. Parmar, managing director, Polyblends Ltd to teach plastic waste management. Dr Parmar is very active in this area and is a part of various government committees and students have benefited a lot through his expertise.
6. Invited Dr Tippana from industry to teach plastic waste management. He is working in the area of chemical recycling of polymers. His vast practical experience culminated into effective teaching with more emphasis on practical aspects and the case study approach helps students to understand the subject quickly.
7. Procurement and Installation of 3D Printer: to keep pace with the industrial development, the 3D printer was procured which is used by Ph.D. and M E students. 3D printing is added in the course design of plastic molds and dies which is widely used for making prototypes using various polymers.
8. Looking at the need of the industry Upgradation of CAD/CAM Lab Presently we have following softwares.
    - Minitab is used for optimization,
    - Hyper works from Altair – this is used to do FEA.
    - Unigraphics from Siemens – for CAD modeling
    - Mold wizard – used for Modeling of mold, working visualization, internal flow analysis,

- Moldex 3D – for analysis for warpage, air trapping, the strength of components, weld lines
- Matlab – for mathematical modeling and to test loops.
- Solidworks – Used for CAD Modeling

9. Training was organized for Unigraphics from Siemens and for Moldex 3D to the M.E. Plastic Engineering students of the department.

➢ **Guest lectures by industry expert and industrial visits:**

Most of the topics of M.E. Plastic Engineering were covered providing recent trends and advancements in as compared to syllabus. The list of lectures is mentioned below.

- The guest lecture was organized on topic "Polymer R&D readiness" delivered by Dr. J.N. Kapadia
- The lecture "Advanced plastic product design-know how with case study" was related to the course Plastic Product Design and Testing and the lecture was delivered by Mr. Ravindra Gupta, A Vice President Camlin Kokuyo Ltd Mumbai.
- An insight of masterbatches was given by Dr. M.B. Parmar, Director, Polyblend color concentrates. He is the alumnae turned to be first generation entrepreneur from the department of General Engineering.
- The use of Glass fibers in Plastic composites for structure repair work was discussed by Dr. Mangesh Joshi, director, Sanrachana Structural strengthening Pvt. Ltd.
- The role of simulation softwares in Injection molding process was discussed by Dr. Mahesh Divekar, BASF, Moldflow simulation Division Mumbai.

Sr. No.	Topic	Speaker Details	Date
1.	Cost effective water storage technologies for rural area	Mr. U.M. Paranjpe, Trustee, Jalavardhini Pratisthan Mumbai (a NGO)	29th Sep 2020
2.	Advanced plastic product design-know how with case study	Mr. Ravindra Gupta, Vice President, Camlin Kokuyo Mumbai	2nd Jan 2021
3.	Masterbatches for plastics	Dr. M.B.Parmar, Managing Director at Polyblend Colour Concentrates Vapi	15th Jan 2021
4.	Prof. B.D.Tilak Endowment Lecture on "Industry 4.0"	Prof. Pradeep Kumar, IIT Roorkee	22nd Jan 2021
5.	Polymer R and D readiness	Dr. J.N. Kapadia, Head of Product Development at Henkel Adhesives Mumbai	28th March 2021
6.	Plastic Pipes upto 2.5 m diameter for conveyance of water and wastewater	Dr. Madhusudan Chaudhari, Vice President, Jain Irrigation Systems Limited Pune	14th Sep 2020
7.	Use of Glass and Carbon fibre Polymer composites for repairs , retrofit and rehabilitation of Structures	Dr. Mangesh Joshi, Founder and director at Sanrachana Structural Strengthening Pvt. Ltd. Mumbai.	21st Sep 2020

8.	Integrated Urban Water Management-Why, What and How	Dr. Bhakti Devi, Sydney Water Corporation, Sydney, Australia	25th Sep 2020
9.	Role of Simulation Softwares in Injection Molding of Plastics	Dr. Mahesh Divekar, CAE Leader, Performance Materials BASF India Ltd.	03rd Apr 2022

- **Syllabus Revision**

The feedback and suggestions of industrial personnels were taken for syllabus revision whenever they are invited to for a guest lecture or taking examination.

- Shri. Karuna Karan Raju, Siemens India Ltd., Kalwa, Thane.
- Dr. Nitin Parashram Gulhani, Department of Mechanical Engineering, VJTI Mumbai
- Dr. Jitendra Kapadia, Head, Product Development, IEMA Adhesive Technologies and consumer products Pvt. Ltd, Henkel Adhesives Pune.
- Dr. M. B. Parmar, Director, Polyblend Colour Concentrate, Goregaon, Mumbai 104
- Dr. Kedar Chaudhari, Director (Tech), Diversey India Pvt. Ltd., Ghatkopar (W).
- Dr. Jagdish Patil, Manager Chemtrols Ind Ltd., MIDC Taloja, Raigad - 410208
- Mr. Ravindra Gupta, Vice President, Research and Development, Kokuyo Camlin Ltd. Mumbai.
- Dr. Mahesh Dhekane , Technology Head-India, Colour and Additives at Avient Corporation, Clariant Chemicals Pvt. Ltd, Mumbai.

6.2. Improvement in Quality of Projects (10)

(Institute Marks: 10)

Following list gives the various project undertaken by M.E. Plastic Engineering Students

Sr. No.	Name of Student	Project Title
1.	Avinash Anil Raut	Study of Asphalt Design Using Recycled Plastic Waste (PET) for Sustainable Flexible Pavement Construction
2.	Vikrant Goswami	Effect of various factors on properties of fly ash filled PPO (polyphenylene oxide)
3.	Keyur kumar Sureshbhai Vadaliya	Synthesis of modified PVA/Cellulose ultrafiltration membrane for industrial application
4.	Mohit Prakash Salunkhe	Design development and analysis of automotive interior parts
5.	Paras Manojkumar Tholiya	Design, development, and Analysis of Glove Box
6.	Sai Shrikantrao Deshmukh	Product development of switch cavity injection mold with the help of Moldflow simulation software
7.	Akshay Shailesh Jain	Recycling of Non-food packaging materials and converting them into a useful household detergent bottle.

8.	S Jeya Varshini	Lifetime assessment of Recycled polyamide
9.	Sajit Ajithan	Optimization of injection molding process parameters for a studio bottom cover
10.	Suraj Rajendra Mhaske	Polypropylene nanocomposites with enhanced thermal and electrical properties for automotive and electronics applications

The students from M.E. Plastic Engineering are free to work on industrial projects. Also, some of their developed technologies have been commercialized by respective organizations. This is a significant contribution made by our ME students to current trends in the plastic industry sector.

Some of the students who have gone abroad for higher studies are also pursuing education in the topics relevant to the M.E. Plastic Engineering curriculum. From this it is clear that our curriculum is competent enhancing growth in plastic engineering sector.

6.3 Improvement in Placement, Higher Studies and Entrepreneurship (10)

(Institute Marks: 10)

Assessment is based on improvement in:

- *Placement: number, quality placement, core industry, pay packages, etc.*
- *Higher studies: admissions for pursuing Ph. D in premier institutions*
- *Entrepreneurs*

Year 2021-22

Sr. No.	Name of the student placed	Enrollment No.	Name of the Employer	Appointment letter reference no. with date
1	Akshay Shailesh Jain	21PLS202	Bhavi Plast Pvt. Ltd Mumbai	Letter Ref.: 24th May 2023
2	Ashish Jayant Kulkarni	21PLS203	JJ Plast Alloy Pvt. Ltd.	Letter Ref.: 11th May 2023
3	Avinash Ganesh Chavhan	21PLS204	Not received	Not received
4	Mihir Macchindra Jadhav	21PLS206	JJ Plast Alloy Pvt. Ltd.	Letter Ref.: 3rd May 2023
5	S Jeya Varshini	21PLS208	Dow Chemicals Pvt. Ltd.	Letter Ref.: 1st July 2023
6	Sajit Ajithan	21PLS209	Kingfa Science and Technology Pvt. Ltd Pune	Letter Ref: 05th April 2023
7	Shweta Sanjay Pandagale	21PLS210	Not yet employed	Not yet employed
8	Suraj Rajendra Mhaske	21PLS211	Henkel Adhesives Technologies India Pvt Ltd, Navi Mumbai	Letter Ref.: Nil
9	Vikas Bhausaheb Mhaske	21PLS212	Polyone Polymers India Pvt. Ltd, Ranjan gaon, Pune	Letter Ref.: 25th April 2023

Year 2020-21				
Sr. No.	**Name of the student placed**	**Enrollment No.**	**Name of the Employer**	**Appointment letter reference no. with date**
1	Dipashree Arun Penkar	20PLS201	Henkel Adhesives Technologies India Pvt Ltd, Navi Mumbai	Letter Ref: 2097 Dt: 14th Nov 2022
2	Dnyanada Diwakar Chaudhari	20PLS202	Henkel Adhesives Technologies India Pvt Ltd, Navi Mumbai	Letter Ref: 2097 Dt: 14th Nov 2022
3	Meghna Pratham Humbal	20PLS203	Shree Bhagubai Mafatlal Polytechnic Institute (SBMP), Mumbai	Letter Ref.: Sponsored Candidate
4	Mehul Sanju Karkar	20PLS204	Kent Engineering India Pvt Ltd	Letter Ref. HR/330/22 Dt: 24th Nov 2022
5	Prajwal Suresh Ghadekar	20PLS205	Kingfa Science and Technology (India) Ltd	Letter Ref. 17th Dec 2021
6	Sai Shrikantrao Deshmukh	20PLS206	Brose India Automotive Systems Pvt Ltd,Pune	Letter Ref:29th Sep 2022
7	Shreyash Vijay Tayde	20PLS207	Kingfa Science and Technology (India) Ltd	Letter Ref: 26th Sep 2022
8	Deepshikha Katiyar	20PLS208	Kingfa Science and Technology (India) Ltd	Letter Ref: 17th Sep 2022
9	Nabraz Sheikh	20PLS209	Yet to complete his degree	
10	Rutul Bhalchandra Thorat	20PLS210	Yet to complete his degree	
11	Tanvi Sanjay Suryawanshi	20PLS211	Polyone Polymers India Pvt Ltd , Bhiwandi .	Letter Ref: 2nd Nov 2022

Year 2019-20				
Sr. No.	**Name of the student placed**	**Enrollment No.**	**Name of the Employer**	**Appointment letter reference no. with date**
1	Akash Valmik Mahajan	19PLS201	FAURECIA India Pvt Ltd, Pune	Letter Ref.: Nil
2	Harshal J. Shatalwar	19PLS202	Entrepreneur (Startup)	Not received
3	Jagadish R	19PLS203	Ashirvad Pipes Bengaluru	Letter Dt: 31st May 2023
4	Keyur kumar Sureshbhai Vadaliya	19PLS204	Lexcru Water Tech Pvt Ltd. Ahmedabad	Ref: LEX/ WATERTECH/ 2023/05
5	Mohit Prakash Salunkhe	19PLS205	Capgemini Technology Services India Pvt Ltd, Pune	Letter Ref.: 2nd March 2022

6	Naveen Nitin Tembhurnikar	19PLS206	Shree Bhagubai Mafatlal Polytechnic Institute (SBMP), Mumbai	Letter Ref.: Sponsored Candidate
7	Paras Manojkumar Tholiya	19PLS207	FAURECIA India Pvt Ltd , Pune	Letter Dt:26th April 2022
8	Sachin Anant Kamble	19PLS208	Shree Bhagubai Mafatlal Polytechnic Institute (SBMP), Mumbai	Letter Ref.: Sponsored Candidate
9	Swagata Ray Chaudhury	19PLS211	Sparsh Polychem, Delhi SG Control and Switchgears Gurgaon	Letter Ref.: Nil

- The placement trend at the department of General engineering is very good and recognizable. Almost all the students are getting placed in a reputable company. Some of the students have joined R &D s, Production departments etc.
- It is also observed that most of the students were absorbed in the industries where they have done their Research Project I, II, III and IV courses.

Following is the list of our Alumni who have become successful entrepreneurs in the plastic manufacturing & product designs.

- Dr. M B Parmar, Director, Polyblemd Masterbatch Industries, Goregaon (W), Mumbai. Presently Chairman – Education and Plastic Image Committee, The All-India Plastics Manufacturers Association, (AIPMA), Marol, Andheri ((E), Mumbai 93
- Ajit More, SSV Piping Industries M I D C, Lote Parshuram, Tal: Khed, Dist: Ratnagiri is manufacturing pipes of different types and supplying them in various parts of India.
- Girish Khadake, Heera Agro Industries, Jalgaon he is manufacturing various plastic products required for Agro Industries and supplying them all over India. Recently he got Customer viewpoint – Youth Icon for his performance at Kaviyatri Bahinabai Chaudhari North Maharashtra University, Jalgaon on 29th August 2019

6.4. Improvement in the quality of students admitted to the program (10)

(Institute Marks: 05)

- *Assessment is based on improvement in terms of ranks/score in GATE examination.*

Mr. Durgesh Jaiswal from DOW Chemicals joined this program as a sponsored candidate and currently pursuing his M.E Plastic Engineering degree.

After getting feedback from the students, alumni about a unique interdisciplinary programme in plastic engineering, there is an increase in the number of publications for this program from the students from various specialization. The students are more inclined to join the M.E Plastic programme, because of the introduction of subjects like finite element analysis, plastic waste management, CAD/CAM/CAE and encouraging students for industrial projects and placement records.

GATE Score	CAY	CAYm1	CAYm2
Highest Score	-	-	321
Minimum Score	-	-	-

Table 6.4.1

6.5. Improvement in quality of paper publication (10)

(Institute Marks: 10)

1. It is observed that no. of publications, no. of peer-reviewed conference papers, invited lectures, has been increased from year 2020.
2. After completion of research projects, students publish their research work in reputed Scopus/SCI Indexed Journals, Conference proceedings, and present for Oral presentation.
3. Our M.E. students started publishing their research work in various conferences and journals. Due to the increase in the number of Ph.D. research Scholars from various disciplines in the department, M.E. Students started taking an interest in research activities. Sponsored candidate from industry and full-time Doctoral fellowship students, quality of writing of student improved in a lot.
4. List of research publications and conference proceedings papers of M.E Plastic Engineering students-

    - Effect of Water Absorption on the Mechanical Properties of Wheat Straw Fibre Reinforced Polystyrene Composites, R.S.N Sahai, Ankita Shinde, Deepankar Biswas and Asit B. Samui, 2022, ASM Sc. J., 17, 1-8
    - R S N Sahai and Ravindra Pardeshi, "Comparative study of the effect of different coupling agent on Mechanical Properties and water absorption on wheat straw reinforced polystyrene composites" in Journal of Thermoplastic Composite Materials April 2019.
    - Effect of Water Absorption on Mechanical Properties of Treated and Untreated Hemp Fiber Reinforced Polyester Composites, RSN Sahai, SA Kamble, D Biswas, M Yadav, AB Samui, Journal of The Institution of Engineers (India): Series E, 1-10
    - Effect of alkali and silane treatment on water absorption and mechanical properties of sisal fiber reinforced polyester composites, RSN Sahai, D Biswas, MD Yadav, A Samui, S Kamble, Metallurgical and Materials Engineering 28 (4), 641-656.
    - Understanding the Operations of the Indian Dairy Industry-A Case Study, Vibha Agrawal, Mukesh Achari, Sanmesh Kharade, Keyur Vadaliya, Mehul Karkar, Dilip Sarode, Bhartiya Krishi Anushandhan Patrika, 1-7.
    - M.E students have also achieved the best paper presentation award in conference titled "Advances in Sustainable Research for Energy and Environmental Management (ASREEM-2021)", organised by Department of Chemical Engineering, Sardar National Institute of Technology, Surat (India) on August 06-08, 2021.

6.6. Improvement in laboratories (10)

(Institute Marks: 10)

Due to the increase in postgraduate M.E. and Ph.D. student registration, each laboratory of the department is undergoing upgradation.

A. Processing Laboratory

1. Twin-screw Extruder, D22 mm co-rotating along with pelletizer, is used for processing of plastic materials.
2. Recently tumbler mixer and oven are purchased to upgrade the laboratory facility.
3. The processing lab is equipped with twin-screw extruder, injection, compression molding machines etc.

B. CAD/CAM/CAE Laboratory

1. 3D Printer
2. Looking at the need of the industry Upgradation of CAD/CAM Lab Presently we have
    - MiniTab which is used for optimization,
    - Hypermesh from Altair – this is used to do basic FEA.
    - Unigraphics from Siemens – for CAD modeling
    - Mold wizard – used for Modeling of mold, working visualization, internal flow analysis,
    - Moldex 3D – for analysis for warpage, air trapping, strength of components, weld lines
    - Matlab – for mathematical modeling and to test loops.
    - Solidworks – Used for CAD Modeling

C. Cement Composite Laboratory

1. To understand the effect of various polymer-based construction chemicals, concrete mixer, vibrating shaker machine, sieve analysis equipment, and cement setting time determination apparatus were procured and installed.
2. To demonstrate testing Compression testing machine, and permeability testing apparatus are installed.
3. Cement composite Lab is set up in the Department along with non-destructive testing facilities such as Hammer test, and ultrasonic pulse-velocity test apparatus are procured.

Annexure-I

Program Objectives (2020-21, 2021-22)

PO1: An ability to independently carry out research /investigation and development work to solve practical problems.

PO2: An ability to write and present a substantial technical report/document.

PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

PO4: An ability to use modern tools, software, equipment etc. to analyze and obtain solutions to problems.

PO5: An ability to systematically break up complex problems in realizable steps related to mold design, processing of plastic, plastic product design and solve them.

Program Objectives (2022-23)

PO1: An ability to be effective in the design of engineering technology solutions and the practical application of engineering technology principles using high safety standards.

PO2: An ability to develop communication skills to write and present a substantial technical report/document.

PO3: An ability to understand and apply professional, ethical, and quality standards of excellence consistent with plastics industry.

PO4: An ability to serve their communities and the environment through innovations in plastic technology/engineering.

PSO: An ability to systematically break up complex problems in realizable steps related to mold design, processing of plastics, plastic product design and solve them.

Declaration

INSTITUTE OF CHEMICAL TECHNOLOGY रसायन तंत्रज्ञान संस्था
Campuses - Matunga, Mumbai • IOC Bhubaneswar, Odisha • Marathwada, Jalna
Category I Deemed to be University (MHRD/UGC) A++ Grade by NAAC (CGPA 3.77)
Elite Status and Centre of Excellence–Govt. of Maharashtra

Professor Aniruddha B. Pandit
FNA, FTWAS, FASc, FNAE, FNASc, FMASc
J.C. Bose National Fellow
UGC Research Scientist, Professor
Vice Chancellor

DECLARATION

I undertake that, the institution is well aware about the provisions in the NBA's accreditation manual concerned for this application, rules, regulations, notifications and NBA expert visit guidelines in force as on date and the institute shall fully abide by them.

It is submitted that information provided in this Self-Assessment Report is factually correct.

I understand and agree that an appropriate disciplinary action against the Institute will be initiated by the NBA in case any false statement/information is observed during pre-visit, visit, post visit and subsequent to grant of accreditation.

Date: 8-6-2023
Place: MUMBAI

Signature & Name
Head of the Institution with seal

VICE CHANCELLOR
Institute of Chemical Technology
(University under Section-3 of UGC ACT OF 1956)
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