



**AISSMS**  
**COLLEGE OF ENGINEERING**

ज्ञानम् सकलजनहिताय  
Accredited by NAAC with "A+" Grade



## ***CHEMIXIR NEWSLETTER***

**Principal: Dr. D. S. Bormane**

**Jan 2025 to June 2025**

**Head of Dept: Dr. A V Mohod**

**Month of Release: July 2025**

### **Department Vision:**

To be a leader in Chemical Engineering education providing service to society

### **Department Mission:**

1. To prepare graduates for **responsible positions** in chemical industry, academia and research
2. To prepare graduates to **analyze and solve problems** of chemical industry, academia and research
3. To strengthen industry-institute interaction to develop **industry oriented attributes** like attitude, soft skills, team work and leadership

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

1. **Competency:** To prepare competent graduates in Chemical Engineering so that they are successful in their professional career in industry, academia or research
2. **Problem Solving Skills:** To prepare graduates who can identify, analyze, research and solve Chemical Engineering problems of practical importance to industry, academia or research
3. **Leadership Skills:** To prepare graduates with effective communication, teamwork and leadership skills so that they can play effective role in industry, academia and research institutes.

### **Program Specific Outcomes (PSO)**

Chemical Engineering graduates will be able to

1. Identify, analyze, design and develop solutions to Chemical Engineering problems of practical importance to industry and society.
2. Demonstrate sound understanding of Chemical engineering fundamentals to solve problems through the use of modern experimental methods, computer aided design and simulation software



**Dr. D S Bormane**

***From Principal's Desk...***

It is a matter of great pride and satisfaction for AISSMS COLLEGE OF ENGINEERING to bring out the News Letter 'CHEMIXIR' Released from the Department of Chemical Engineering. The College has made tremendous progress in all areas of academic, non-academic, and capacity-building relevant to staff and students. I am confident that this issue of the Department News Letter will send a positive signal to the staff, students and the person who are interested in Technical education and Technology based activities. A News Letter is like a mirror that reflects the clear picture of all sorts of activities undertaken by a Department and develops writing skills among students in particular and teaching faculty in general my heartfelt Congratulations to staff members and Students for their fruitful effort. With Best Wishes.



**Dr A V Mohod**

***From HOD's Desk...***

Department of Chemical Engineering was established in the year 1996, with an intake capacity of 40 students for UG which was increased to 60 students in 1997. The PG program was started in 2011 with an intake of 18 students. The Department has well-qualified and experienced faculty with an average experience of 8-10 years. Faculty is also involved in research & professional activities inside & outside the campus. They are encouraged to upgrade their knowledge and qualifications The department was successful in giving consistently good academic results in the last three years and motivating the students to be involved in extracurricular and co-curricular activities like paper presentations and project competitions leading towards all-around development of our students. The Department has well-equipped laboratories with sophisticated equipment. We have organized many workshops and seminars for the students and staff.

***From the Editor's Desk....***

It gives us great pleasure to hand over to you "CHEMIXIR" the newsletter of the Chemical Engineering department. The department has 18 staff members and more than 180 students. All of us are involved in number of activities and working for development of the department. The Newsletter is a common platform to showcase the talents of the department. It also provides for showcasing of achievements and efforts taken by one and all which contribute towards department strengths. It is our attempt to get maximum contribution from staff and students to come together and interact through this newsletter. We try to pick the moments of guest lectures conducted by department, various industry visits carried out, competitions organized, achievements and participation by students and staff. We hope this newsletter will help in its own way to achieve our goal & realize our vision progressively. Hope you will find this newsletter informative. Your suggestions for improvement in the newsletter are welcome

## **Chemixir, Chemical Department Newsletter**

### **Editorial Board**

Published at: Department of Chemical Engg, All India Shri Shivaji Memorial  
Society's College Of Engineering, Pune - 411001



***Prof. Ms. P.S. Tadkar***



**Ms.Sfurti Kaduskar**



**Mr.Yogeshwar Ingale**



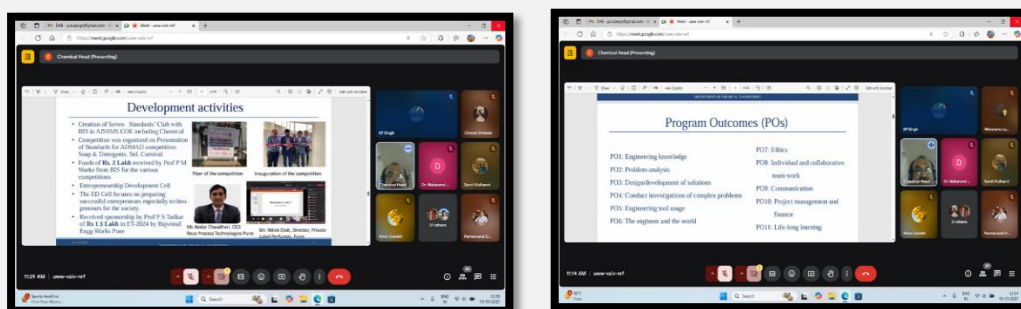
**Mr.Kumar Gome**

### a. DAB Meeting

Dr PN Dange conducted DAB Meeting on May 03, 2025. The details are as follows:

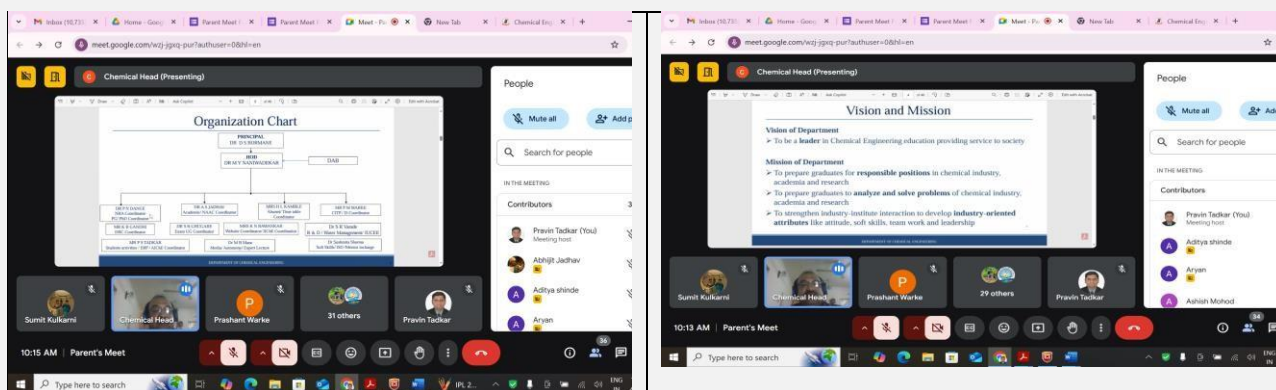
### Purpose of Meeting

1. To prepare graduates for responsible positions in chemical industry, academia and research
2. To prepare graduates to analyze and solve problems of chemical industry, academia and research
3. To strengthen industry-institute interaction to develop industry-oriented attributes like attitude, soft skills, teamwork and leadership



### **b. Parents Meet**

The AIChE Student Chapter, Department of Chemical Engineering, AISSMS COE Pune, organized an online **“Parents Meet”** on **12th April 2025**. The objective of the meeting was to foster a healthy Parent-Teacher interaction and to create a smooth, transparent, and efficient communication channel for the academic and overall development of students.



### c. Project-Based Learning (PBL) Exhibition

The **Project-Based Learning (PBL) Exhibition** organized on 11<sup>th</sup> April 2025 by the **Department of Chemical Engineering along with AISSMS COE AChE Students Chapter, AISSMS College of Engineering, Pune**, served as a dynamic platform for students to demonstrate their technical knowledge, creativity, and problem-solving abilities through practical, hands-on projects. Held as part of the department's commitment to experiential learning, the exhibition focused on nurturing innovation,



encouraging interdisciplinary thinking, and bridging the gap between theoretical concepts and real-world applications.



### **Training program on “Sewage Treatment” and Alumni Meet at AISSM College of Engineering, Pune**

The AISSMS College of Engineering conducted an STP course for the Social Development Department of Pune Municipal Corporation staff from 16th March to 23rd March. A total of 13 coordinators were given training on Sewage Treatment at college. CONDUCTED ON 9th May 2025 at AISSMS COE Pune.



**Live Memorandum of Understanding (MOU)**

**TOTAL FUNCTIONAL / LIVE MOU INITIATED BY THE DEPARTMENT**

Sl.No.	Name of the collaborating agency / institution / industry / corporate house with whom the MoU / collaboration / linkage is made	Year of signing MoU / collaboration / linkage	Duration of MoU / collaboration / linkage	Actual activities under each MOU
1	Super Aqua Services, Pune	14-08-2023	3 years	Placement and Internship in WTP and STP
2	Celestial Institute of Technology, Pune	08-06-2023	3 years	Interaction regarding Waste water treatment
3	Deccan Environmental Consultants Pvt Ltd Pune	11-05-2022	1 year	Internship , Expert lectures
4	Apptrain Systems, (Corporate Trainers) Vadodara (Gujarat)	11-05-2022	2 years	Expert Lectures, Assistance for Placement and Internship
5	Chemtrol Industries, Gujarat	11-05-2022	1 year	Placement and Internship
6	Bureau of Indian Standards, Pune Branch Office	04-05-2022	2 years	Acivities under 'Standards' Club
7	SARBI Petroleum and Chemicals Pvt Ltd. Mumbai	23-03-2022	2 years	Expert Lectures
8	TKT Consultant , Pune	23-01-2022	1 year	Expert Lectures, MOU
9	Reva Process Technology, Baner, Pune	19-01-2021	10 years	Expert Lectures, MOU
10	Techpert Process Industries, Wakad, Pune	09-01-2020	2 years	Placement, MOU and Industrial Training to students
11	Fluid Technics, Kothrud, Pune	01-01-2020	2 years	Placement, MOU
12	Marcuras Water Treatment India Pvt. Ltd., MIDC, Bhosari, Pune	30-12-2019	2 years	Placement, Industrial Training to students, MOU and Industrial Visit
13	Synergy Process Systems, Baner, Pune	30-12-2019	2 years	Placement, Expert Lectures, Resource Person, Industrial

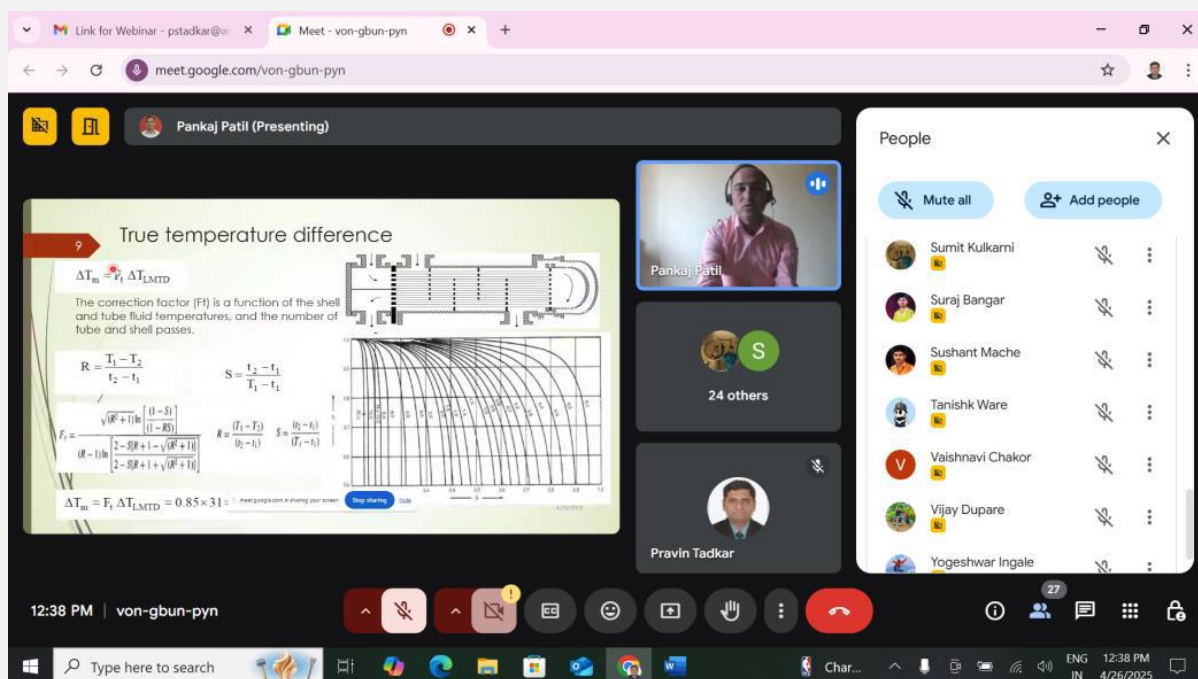
				Training to Students and Faculty Members, MOU, Industry Institute Interaction Program and Short Term Course proposal
14	Indian Biodiesel Corporation, Baramati, Dist. Pune	11-10-2016	10 years	Project work, Internship

### Expert Lectures Organized: AY 2024-2025 (Term -II)

To bridge the gap between industry and academia and to ensure that students stay informed about current trends and practices in the industry, we organize expert lectures every term of the academic year. The list of guest lectures organized during Term II of the academic year 2024–25 is as follows:

SN	Topic	Name of Expert	Date	Faculty Coordinator
1	Heat Exchanger	Dr Pankaj N Pati Praj Industries Ltd Pune	26/04/2025	Prof P S Tadkar
2	Process Safety in Pharmaceutical Industries	Mr. Piyush P Kshirsagar  Inotek Technologies Pvt. Ltd., Thane,	26/04/2025	Dr S B Ghugare

The screenshot displays a Google Meet interface during a presentation. The main content area shows a technical diagram of a shell and tube heat exchanger. The diagram is divided into several sections: a top section showing the overall flow with 'Shellside Flow In' and 'Shellside Flow Out' arrows, a middle section showing a cross-section of the 'Tube Bundle' within the 'Shell', and a bottom section showing the 'Connections Tubesheet' and 'Shell' components. Labels include 'Head', 'Gaskets', 'Baffles Mounting', and 'Tube Bundle'. A sidebar on the right lists participants: Pravin Tadkar (Meeting host), Adarsh Birje, Balkrushna Kutal, and diksha Budhanavar. The bottom status bar shows the time as 12:11 PM on 4/26/2025.



### List of Industrial Visits organized during A. Y. (2024-25)

Sr. No.	Name of the Industry	Faculty Coordinator	Class (No. of Students)	Date
1	Mapro Garden LLP, 122 Shendurjane, Wai-Surur Road, Wai 412803. Dist. Satara, Maharashtra India	Prof. P S Tadkar	SE Chemical (51)	14/02/2025
2	Sudarshan Chemicals Ltd Pune (Online Visit)	Dr. A S Jadhav	TE Chemical (34)	04/04/2025
3	CMET (Centre for Materials for Electronics Technology), Panchawati Rd, Mansarovar, Panchawati, Pashan, Pune 411008	Dr. S Sharma	BE Chemical (7)	23/04/2025
4	Garware Hi-Tech Fibres Ltd., Wai, Dist. Satara	Prof. P M Warke	TE and BE Chemical (30)	03/05/2025





## **Achievements of this year:**

### **Faculty**

#### **Research Publications**

1. ATE HUBER Envirotech Pvt. Ltd., Mumbai and Azeocryst Organics Pvt. Ltd., Mumbai offered R&D Consultancy Projects on 'Advanced Treatment Technologies on Effluents' to Prof. Prashant M Warke, Coordinator- Industry Institute Interaction.
2. M V Bagal, B A Nandgawle, R V Thosar, A V Mohod, P R Gogate, Degradation of pesticides using hybrid processes based on cavitation and photocatalysis: A Review, *Environmental Quality Management* 33(4)(2024)459-486 (ISSN 1520-6483) (I.F-0.262) <https://doi.org/10.1002/tqem.22097>
3. A Mohod, D Clemente, N Klanovicz, P Moreira, M Bagal, A Teixeira, R Giudici, Quantification of phenol degradation using hydrodynamic cavitation based packed bed reactor based on glass balls, *Environmental quality management*, 34(1) (2024) e22268 ) (ISSN 1520-6483) (I.F-0.262) <https://doi.org/10.1002/tqem.22268>
4. M Bagal, B Nandgawle, S Khalfay, R Thosar, A Mohod, P R Gogate, Doehlert matrix-based optimization of degradation of Rhodamine B in a swirling flow photocatalytic reactor operated in circulation mode, *Brazilian Journal of Chemical Engineering*, (2024)1-12, (ISSN 0104-6632) (IF 1.5) <https://doi.org/10.1007/s43153-024-00505-4>
5. MV Bagal, V Rajan, S Shinde, BV Banerjee, V Gole, AV Mohod, Degradation of azo dyes using hydrodynamic cavitation and external oxidants, *Advances in Environmental Technology* 10(1)(2024)55-69, (ISSN 17443563) (IF 0.30) [10.22104/aet.2024.6092.1679](https://doi.org/10.22104/aet.2024.6092.1679)
6. M Bagal, V Mane, H Ambulkar, B Gawande, M Naniwadekar, K N Bawankar, P N Dange, A V Mohod, P R Gogate, Degradation of rhodamine dye using a modified flow photocatalytic reactor in the presence of external oxidants, *The Canadian Journal of Chemical Engineering* (2025) <https://doi.org/10.1002/cjce.25576>
7. A S Jadhav published a paper on "Modification in Strength Parameter (CBR) of Sub-Grade Soil with Addition of Fly Ash" in peer reviewed *International Journal of Advanced Science Computing and Engineering IJASCE : Int. J. of Adv. Sci. Comp. and Eng*, 6(2) - August 2024 91-97
8. A S Jadhav accepted for publication on "Synthesis of EPDM coconut leaves activated carbon composite" in Scopus and web of science indexed journal of *Eco. Env. & Cons.* 31 (July Suppl. Issue) : 2025; pp. (S331-S340)
9. A S Jadhav paper accepted for publication in *The Journal of the Indian Botanical Society*, on "The Adsorption study of Rhodium B (RhB) on activated carbon derived from Coconut leaves. Journal is indexed in Web of Science –Biological Records
10. A S Jadhav published a paper on "Microbial production of Green polymer Xanthan Gum from *Xanthomonas Campestris*" in *Biochemical and Cellular Archives* : 2025, Volume: 25, Issue No: 1(April), Page No: 1039

### Conference Paper Presentation

1. Dr A S Jadhav Dr S S Sharma, Dr P D Baviskar successfully presented a conference paper on the topic as "Evaluating the impact of UV treatment on water quality: A Focus on TDS, Hardness, Chlorine content and COD. 5<sup>th</sup> National Conference on Innovation in Engineering and Technology (NCIET 2025)
2. Prof P S Tadkar presented a paper in national conference Chemcon 2024 during 27-30 December 2024 at NIT Jalandhar

### Financial Support

1. Prof. Prashant M. Warke, Mentor 'Standards' Club- Chemical, AISSMS COE, Pune organized Standards based two competitions and 'Standards Carnival 2025' with financial support of **Rs. 131808/-** and additional for the Event 'Quality Walk' from Bureau of Indian Standards (BIS).
2. Research Grant of Rs. 50,000 awarded to Dr. A V MOHOD Project "Eco-friendly natural resources based detergent preparation for rural Entrepreneurship Development" under the Subject Expert Group- Rural Livelihood and Entrepreneurship Development by UNNAV BHARAT YOJANA, Government of India,
3. Dr A V Mohod acquired Second post doctorate at CNR-STIIMA, Biella, Italy.

### Faculty Development Programme

1. Prof Pravin Sudhakar Tadkar, has actively participated in one-week online Faculty Development Program on "CHEMICAL PROCESS SAFETY "organized by Department of Chemical Engineering, Sinhgad College of Engineering, Pune from 16/12/2024 to 20/12/2024.
2. Prof P S Tadkar participated one-week online FDP on "Process Intensification: Sustainability in Chemical Engineering" organized by Datta Megha College of Engineering, from April 07-11, 2025
3. Prof P S Tadkar participated in an FDP titled as Process Intensification through Heat Transfer Augmentation conducted by the Department of Chemical Engineering, Gharda Institute of Technology, Lavel, Dabhil, Ratnagiri, Maharashtra from 18 to 22 February 2025
4. Prof P S Tadkar participated one-week online FDP on "Cyber Security" organized MBA & Research Center , Sapthagiri NPS University, Bangalore. MCA Department, Indira College of Engineering & Management, Parandwadi Pune. Annasaheb Dange College of Engineering & Technology, Ashta, Maharashtra. NIST University, Odisha in Collaboration with ExcelR Edtech Pvt. Ltd, from February 18-22, 2025
5. Prof Pravin Sudhakar Tadkar, has successfully participated & completed AICTE Training And Learning (ATAL) Academy Faculty Development Program on Integrating Synergism among Chemical Processes and Technologies for Sustainable Development at Sardar Vallabhbhai National Institute of Technology, Surat from 10/02/2025 to 15/02/2025.



6. Prof Pravin Sudhakar Tadkar has active participation in 2-Days International Workshop on “Emerging Trends in Process Engineering and Process Design” (ETPE PD-2024) Organized by the Department of Chemical Engineering on October 23-24, 2024.
7. Prof P S Tadkar, has participated in one-week online Faculty Development Program on “Process Optimization” organized by Department of Chemical Engineering in association with IChE Students Chapter- SRICT, UPL University of Sustainable Technology, Vataria, Ankleshwar, during October 14-18, 2024.
8. Prof P S Tadkar, has participated in one-week online Faculty Development Program on “Process Optimization” organized by Department of Chemical Engineering in association with IChE Students Chapter- SRICT, UPL University of Sustainable Technology, Vataria, Ankleshwar, during October 14-18, 2024.
9. Dr S S Sharma Successfully participated in an FDP titled as Process Intensification through Heat Transfer Augmentation conducted by the Department of Chemical Engineering , Gharda Institute of Technology, Lavel, Dabhil, Ratnagiri, Maharashtra from 18 to 22 February 2025.
10. Dr Maya More successfully completed a FDP for 8 weeks duration on “Biological Process Design for Wastewater Treatment “ conducted by NPTEL-AICTE
11. Dr Maya Mane successfully completed a International FDP on “Emerging Technologies and Innovations “Pioneering Environmental Sustainability from 30.09.2024-04.10.2024 conducted by K K Wagh Education Society Nasik
12. Dr Maya Mane successfully completed a FDP on” Role of Nanotechnology and Sustainable Development from 18-22.10.2024
13. Dr A S Jadhav, Dr S S Sharma participated in five day FDP on “ Chemical Process Simulation using DWSIM” from 11-15 Nov 2024 conducted by GAYATRI VIDYA PARISHAD COE Vishakhapatnam

Dr S Sharma successfully completed AICTE Training And Learning (ATAL) Academy Faculty Development Program on Empowering Educators: Advanced Design Thinking & Innovation conducted by ALL INDIA SHRI SHIVAJI MEMORIAL SOCIETY'S COLLEGE OF ENGINEERING, PUNE-1 from 02/12/2024 to 14/12/2024

#### **Online Courses**

1. Prof P S Tadkar completed NPTEL course on Matlab Based Programming in Chemical Engineering during Jul-Oct 2024
2. Prof P S Tadkar completed NPTEL course on Research Methodology in Natural Sciences during Jan-Apr 2025
3. Prof P S Tadkar completed Udemy course on Process/Chemical Engineering during December 2024
4. Dr S S Sharma Successfully completed a 12-week NPTEL course (Jan-Apr 2025) on Chemical Reaction Engineering II.

#### **Industrial Training / MOU/STTP**

1. Prof P S Tadkar completed industrial training at Naidu Sewage Treatment Plant during the period 05/12/2024 to 19/12/2024

### Placement

Prof. Prashant. M. Warke took initiative & efforts for Campus Recruitment Drives for requirement of Graduate Engineer Trainees in different Industries e.g. Reliance Industries Ltd., Worley India, Thermax Ltd., RayChem RPG Ltd., Neologic Engineers Pvt. Ltd., Techniche Engineering Pvt. Ltd., Metamorphosis Engitech Pvt. Ltd., ENGIE India, SOPAN O & M Pvt. Ltd. for placement of BE students from Chemical, Civil, Electrical and Mechanical.

### Students Achievements

Sr. No.	Name of Student/ Students	Event Name	Event Organised by	Prize/Rank /Achievement
1	Shrutee Borhade	Circular Economy for Sustainable Development	IEI	Best Paper
2	Siddhali Shegar	Publication of Patent		
3	Siddhali Shegar	Publication of Patent		
4	Siddhali Shegar	Publication of Paper		
5	Shrutee Borhade	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	First
6	Kanak Oswal	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	First
7	Siddhali Shegar	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	First
8	Pritesh Gole	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	First
9	Om Surana	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	Second
10	Kunal Hirave	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	Second



11	Shruti Kothawade	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	Third
12	Vaishnavi Rokade	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	Third
13	Yogeshwar Ingale	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	Third
14	Rohit Korade	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	Third
15	Apurva Shelar	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	Consolation Prize
16	Ishwari Pansare	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	Consolation Prize
17	Mayur Tandlekar	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	Consolation Prize
18	Nikhil Rajpurohit	Standard Based TvS Hunt- Indian Standards for Centrifugal Pump	Standards Club AISSMS COE and BIS	Consolation Prize
19	Yogesh Choudhary	AD-MAD on Indian Standards for house hold laundry detergent powders	Standards Club AISSMS COE and BIS	First
20	Yogeshwar Ingale	AD-MAD on Indian Standards for house hold laundry detergent powders	Standards Club AISSMS COE and BIS	First
21	Vaishnavi Rokade	AD-MAD on Indian Standards for house hold laundry detergent powders	Standards Club AISSMS COE and BIS	First

22	Prathamesh Kukade	AD-MAD on Indian Standards for house hold laundry detergent powders	Standards Club AISSMS COE and BIS	Second
23	Vaibhav Kurhade	AD-MAD on Indian Standards for house hold laundry detergent powders	Standards Club AISSMS COE and BIS	Second
24	Vidhi Patil	AD-MAD on Indian Standards for house hold laundry detergent powders	Standards Club AISSMS COE and BIS	Second
25	Mrunal Gatkul	AD-MAD on Indian Standards for house hold laundry detergent powders	Standards Club AISSMS COE and BIS	Third
26	Shruti Kothawade	AD-MAD on Indian Standards for house hold laundry detergent powders	Standards Club AISSMS COE and BIS	Third
27	Riddhima Chaudhari	AD-MAD on Indian Standards for house hold laundry detergent powders	Standards Club AISSMS COE and BIS	Third
28	Sfurti Kaduskar	AD-MAD on Indian Standards for house hold laundry detergent powders	Standards Club AISSMS COE and BIS	Consolation Prize
29	Kumar Gome	AD-MAD on Indian Standards for house hold laundry detergent powders	Standards Club AISSMS COE and BIS	Consolation Prize
30	Rohit Korade	AD-MAD on Indian Standards for house hold laundry detergent powders	Standards Club AISSMS COE and BIS	Consolation Prize
31	Samruddhi Suryawanshi	Chemcon 2024	IChE	Participated
32	SfurtiKaduskar	Chemcon 2024	IChE	Participated

33	Shruti Kothwade	Chemcon 2024	IChE	Participated
34	Vaishnavi Rokade	Chemcon 2024	IChE	Participated
35	Mrunal Gatkul	Chemcon 2024	IChE	Participated
36	Kalyani Rokade	Chemcon 2024	IChE	Participated
37	Kumar Gome	Chemcon 2024	IChE	Participated
38	Prathamesh Jadhav	Chemcon 2024	IChE	Participated
39	Yogesh Choudhary	Chemcon 2024	IChE	Participated
40	Rohit Korade	Chemcon 2024	IChE	Participated
41	Vaibhav Kurhade	Chemcon 2024	IChE	Participated
42	Prathamesh Kukade	Chemcon 2024	IChE	Participated
43	Datta Koli	Chemcon 2024	IChE	Participated
44	Yogeshwar Ingale	Chemcon 2024	IChE	Participated
45	Siddhali Shegar	Circular Economy for Sustainable Development	IEI	Participated
46	Adarsh Birje	Circular Economy for Sustainable Development	IEI	Participated

## Program Outcomes (PO)

Engineering Graduates will be able to:

- **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.