Observation and actions taken based on the results of POs /PSO

POs Attainment Levels and Actions for Improvement- (2019-20)

PO 1: Engineering Knowledge

Target Level	**1.70**	**Attainment Level**	**1.68**

Observations

Attainment is 98.76% of target value. The courses which need attention are: Heat Transfer, Theory of Machines II, Numerical Methods Optimization, Manufacturing Processes II, Hydraulics and Pneumatics and Energy Engineering. The students faced difficulty to understand basic concepts of the courses. Following actions are suggested:

Action 1: Provide additional training and support to students and faculty, viz. tutoring, workshops, or mentoring in order to help them acquire the requisite knowledge.

Action 2: Increase emphasis on fundamental concepts in the curriculum will help students develop a strong foundation in engineering knowledge and better prepare them for advanced concepts.

Action 3: Incorporate project-based learning to help students apply their engineering knowledge in real-world scenarios and improve their understanding of the subject matter.

Action 4: Provide opportunities for hands-on experience which will help students develop practical skills and apply their engineering knowledge in a meaningful way.

Action 5: Collaborate with industry experts to ensure that the program aligns with the current industry requirements, and the students are trained in the latest industry-relevant skills.

PO 2: Problem Analysis

Target Level	**1.42**	**Attainment Level**	**1.41**

Observations

Attainment is 98.82% of target value. The courses having scope of improvement are Engineering Mathematics III, Strength of Materials, Thermodynamics, Applied Thermodynamics, Design of Machine Elements I, Theory of Machines II, Metrology and Quality Control, Design of Machine Elements II. These courses need better understanding through practical knowledge and sound basics. The following actions are to be conducted:

Action 1: Provide additional training and support to students and faculty by tutoring, workshops, or mentoring to help them acquire the required problem analysis skills.

Action 2: emphasize critical thinking skills in the curriculum to help students develop the ability to analyze complex problems and generate effective solutions.

Action 3: incorporate case studies and simulations to provide students with practical problem-solving experience and help them develop their problem analysis skills.

Action 4: provide opportunities for teamwork to help students develop their problem analysis skills by working collaboratively with others and considering multiple perspectives.

PO 3: Design/development of Solutions

Target Level	**1.22**	**Attainment Level**	**1.27**

Observations

Target value is attained. Still there is a room for improvement for some courses. viz. Applied Thermodynamics, Theory of Machines I, Theory of Machines II, Turbo Machinery, Design of Machine Elements II. These kinds of courses need more practice and students need more practice on calculations and derivations related questions. It is proposed to conduct following actions:

Action 1: Provide additional training and support to students viz. tutoring, workshops, or mentoring to help them acquire the design and development skills.

Action2: incorporate project-based learning to help students apply their design and development skills in real-world scenarios and improve their understanding of the subject matter.

Action 3: provide opportunities for hands-on experience to help students develop practical skills and apply their design and development knowledge in a meaningful way.

Action 4: emphasize innovation and creativity to help students develop novel solutions to complex problems.

Action 5: collaborate with industry experts to help ensure that the program aligns with the current industry requirements, and the students are made aware regarding the latest industry-relevant skills.

PO 4: conduct Investigations of Complex Problems

Target Level	**1.25**	**Attainment Level**	**1.33**

Observations

Target value is attained. There is a need to concentrate on Thermodynamics, Applied Thermodynamics, Fluid Mechanics, Theory of Machines I, Theory of Machines II, Hydraulics

and Pneumatics. It is essential to prepare mindset towards investigation if the problems seem difficult for few students, hence following activities are recommended:

Action 1: provide additional training and support to students and faculty through tutoring, workshops, or mentoring to help them acquire the required investigation skills.

Action 2: incorporate research-based learning to help students develop their investigation skills by applying the scientific method to complex problems.

Action 3: emphasize critical thinking skills to help students develop the ability to investigate complex problems and generate effective solutions.

Action 4: provide opportunities for hands-on experience to help students develop practical investigation skills and apply their knowledge in a meaningful way.

Action 5: collaborate with industry experts to help ensure that the program aligns with the current industry requirements.

PO 5: Modern Tool Usage

Target Level	**1.28**	**Attainment Level**	**1.43**

Observations

The Target value is attained. Still to strengthen the courses Design of Machine Elements I, Numerical Methods and Optimization, Design of Machine Elements II, Machine Shop II, CAD/CAM and Automation and Dynamics of Machinery; following action are to be taken:

Action 1: conduct an assessment to identify the reasons why the target for modern tool usage is not being met. This assessment could include analyzing data related to tool usage, conducting surveys.

Action 2: identify barriers from the assessment that are preventing the target from being met. These barriers could include lack of inadequate resources, or inadequate tool functionality.

Action 3: communicate the importance of modern tool usage to students and emphasize the benefits. This will help to create a culture that values and promotes the use of modern tools.

Action 4: provide training to student and faculty to ensure that they have the skills and knowledge required to use the modern tools effectively.

PO 6: The Engineer and Society

Target Level	1.42	Attainment Level	1.41

Observations

The Target value is attained. The courses Engineering Metallurgy, Design of Machine Elements I, Heat Transfer and Seminar have scope where students need to indulge in applying their learned knowledge in practical circumstances; maybe in small groups. The actions indicated are:

Action 1: identify barriers that are preventing the target from being met, such as lack of emphasis on social and ethical considerations, inadequate student engagement with real-world societal issues, limited opportunities for students to engage in community service and outreach activities.

Action 2: develop an action plan to address the barriers identified in the assessment. This plan should include specific actions that need to be taken, timelines for completion, and responsible parties.

Action 3: ensure adequate resources, such as funding, staff, and time, are allocated to implement the action plan.

Action 4: include a greater emphasis on social and ethical considerations in engineering practice such as integration of case studies that demonstrate the impact of engineering on society, discussions of ethical frameworks and decision-making, and opportunities for students to engage in interdisciplinary projects that address real-world societal issues.

Action 5: foster community engagement by providing opportunities for students to engage in community service or outreach activities viz. service learning projects that address community needs, participation in engineering-related community events, or collaboration with local non-profit organizations.

PO 7: Environment and Sustainability

Target Level	1.39	Attainment Level	1.56

Observations

The attainment of the target is met, the courses Refrigeration and Air conditioning, Mechatronics, Energy Engineering have a compelling need to make students aware about the Sustainable Development Goals (SDG). Capturing the attainment of the same is a challenge

as being an affiliated Institute curriculum is not designed accordingly. Reasons for the same are absence of chance to frame questions in University exams and Partial student participation. To overcome the lacuna, following actions are pointed:

Action 1: identify barriers that are preventing the target from being met. The barriers such as lack of emphasis on environmental and sustainability considerations in program curriculum, inadequate student engagement with environmental issues and limited opportunities for students to engage in sustainability-focused research or projects.

Action 2: develop an action plan to address the barriers identified in the assessment. This plan includes specific actions that need to be taken, timelines for completion, and responsible parties.

Action 3: foster student engagement with environmental issues by providing opportunities for students to engage in sustainability-focused projects, including projects related to renewable energy or sustainable design, participation in sustainability-focused competitions, or collaboration with local organizations working on sustainability issues.

PO 8: Ethics

Target Level	**1.50**	**Attainment Level**	**1.83**

Observations

The target of attainment value is met. The courses Soft Skills, Skill Development and Seminar have to largely take of care-off ethics through stated actions:

Action 1: conduct an assessment to identify the reasons why the target for "Ethics" program outcome is not being met. This assessment includes analyzing data related to student performance and conducting surveys with students.

Action 2: identify barriers on ethics in program curriculum, inadequate student engagement with ethical issues, and limited opportunities for students to engage in ethics-focused activities.

Action 3: include greater emphasis on ethics in engineering practice like integration of case studies that demonstrate the importance of ethics in engineering, discussions of ethical frameworks and decision-making, and opportunities for students to engage in ethics-focused activities.

Action 4: foster student engagement with ethical issues by providing opportunities for

students to engage in ethics-focused activities, viz. debates or discussions on ethical issues in engineering, participation in ethics-related competitions, or collaboration with local organizations working on ethical issues.

PO 9: Individual and Team Work

Target Level	**1.43**	**Attainment Level**	**1.54**

Observations

The Target value is attained. Attempts to be made for enhancement of the courses Soft Skills, Design of Machine Elements I, Design of Machine Elements II, Seminar, Project I and Project II. The actions put forward are:

Action 1: conduct an assessment to identify the reasons why the target is not being met, by analyzing data related to student performance and conducting surveys of students.

Action 2: identify barriers on individual and team work in program curriculum, inadequate student engagement with teamwork issues, and limited opportunities for students to engage in team-based projects.

Action 3: develop an action plan to address the barriers identified in the assessment including specific actions that need to be taken, timelines for completion, and responsible parties.

Action 4: include a greater emphasis on individual and team work while delivering the course contents on engineering practice like integration of case studies that demonstrate the importance of individual and team work in engineering, discussions of teamwork dynamics and conflict resolution, and opportunities for students to engage in team-based projects.

Action 5: foster student engagement with individual and team work issues by providing opportunities for students to engage in team-based projects that require collaboration and communication, and working in diverse teams.

Action 6: increase faculty training on individual and team work in engineering practice. This could include workshops or training sessions focused on teamwork dynamics, conflict resolution, or integrating individual and team work into course content.

PO 10: Communication

Target Level	1.23	Attainment Level	1.39

Observations

The Target value is attained. Increasing the participation of students in Team work activities is needed to boost effective communication in the courses Material Science, Theory of Machines I, Metrology and Quality Control, Skill Development, Design of Machine Elements II, Seminar, CAD/CAM and Automation and Project. To enhance effective communication following actions are urged:

Action 1: conduct an assessment to identify the reasons why the target is not being met, by analyzing data related to student performance and conducting surveys.

Action 2: identify barriers that are preventing the target from being met, such as lack of emphasis on communication in program curriculum, inadequate student engagement with communication issues, and limited opportunities for students to engage in communication-focused activities.

Action 3: develop an action plan to address the barriers identified in the assessment such as specific actions that need to be taken, timelines for completion, and responsible parties.

Action 4: include a greater emphasis on communication in engineering practice, like integration of case studies that demonstrate the importance of communication in engineering, discussions of effective communication strategies and techniques, and opportunities for students to engage in communication-focused activities.

Action 5: foster student engagement with communication issues by providing opportunities for students to engage in communication-focused activities; including presentations, technical writing assignments, or team-based projects that require clear and effective communication.

PO 11: Project Management and Finance

Target Level	1.42	Attainment Level	1.41

Observations

This PO is attained, to strengthen the Manufacturing Processes I, Design of Machine Elements I, Skill Development, Mechatronics and Project I course following actions are suggested:

Action 1: conduct an assessment to identify the reasons why the target for "Project Management and Finance" program outcome is not being met. This assessment includes

analyzing data related to student performance and conducting surveys.

Action 2: identify barriers on project management and finance in program curriculum, inadequate student engagement with project management and finance issues, or limited opportunities for students to engage in project management and finance-focused activities.

Action 3: develop an action plan to address the barriers identified in the assessment, including specific actions that need to be taken, timelines for completion, and responsible parties.

Action 4: include a greater emphasis on project management and finance in engineering practice, by the integration of case studies that demonstrate the importance of project management and finance in engineering, discussions of effective project management strategies and finance management techniques, and opportunities for students to engage in project management and finance-focused activities.

Action 5: foster student engagement with project management and finance issues by providing opportunities for students to engage in project management and finance-focused activities, such as projects that require students to create project plans, manage budgets, and analyze financial data.

Action 6: increase faculty training on project management and finance in engineering practice, like workshops or training sessions focused on effective project management strategies and finance management techniques, or integrating project management and finance skills into course content.

PO 12: Life-long Learning

Target Level	**1.08**	**Attainment Level**	**1.27**

Observations

Target of attainment is achieved. Students need to realize that learning is a never ending process, hence need to concentrate on the courses Material Science, Fluid Mechanics, Manufacturing Process-II and Project I through the following actions:

Action 1: conduct an assessment to identify the reasons why the target for "Life-long learning" program outcome is not being met, viz. analyzing data related to student performance, conducting surveys or interviews with students.

Action 2: identify barriers on life-long learning in program curriculum, inadequate student engagement with life-long learning issues, or limited opportunities for students to engage in

life-long learning-focused activities.

Action 3: develop an action plan to address the barriers identified in the assessment, by including specific actions that need to be taken, timelines for completion, and responsible parties.

Action 4: include a greater emphasis on life-long learning in engineering practice through the integration of continuing education and professional development opportunities, discussions of the importance of life-long learning in engineering practice, and opportunities for students to engage in life-long learning-focused activities.

Action 5: foster student engagement with life-long learning issues by providing opportunities for students to engage in life-long learning-focused activities, through seminars, workshops, or training sessions focused on developing skills for life-long learning, such as critical thinking, problem-solving, and self-directed learning.

PSO 1: Our graduates will have competencies in usage of modern tools to optimally design, develop and manufacture product and/or process.

Target Level	**1.16**	**Attainment Level**	**1.32**

Observations

Attainment is surpassing the target value. Courses which need to be pondered are Strength of Materials, Computer Aided Machine Drawing, Engineering Mathematics – III, Energy Engineering and Mechanical System Design. As the Institute is affiliated to University, there are limitations on framing questions in university papers. Students do not get much opportunity to practically design for actual/ industrial project(s).

Action 1: Conduction of Expert lectures to overcome the lacunae of students' awareness about mechanical elements and systems.

Action 2: Facilitating the knowledge gain through mini-projects, projects, Project based learning, internship, industrial visits.

Action 3: Exploration of different manufacturing processes such as 3D printing, CNC machining, to understand their capabilities and limitations in producing mechanical parts and systems.

PSO 2: Our graduates will have incremental skills to enhance employability in the automotive and thermal engineering fields.

Target Level	**1.27**	**Attainment Level**	**1.35**

Observations

Attainment is fully met. The course which needs consideration is. Students have theoretical knowledge and have limitations to perform in the practical industrial concerns.

Action 1: Facilitating, promoting and motivating students to undergo Internships in Industries

Action 2: Organizing Industrial visits and conduction of Expert lectures by inviting Alumni, Industrial professionals, Entrepreneurs to make students aware about the actual industrial practices.

Action 3: Providing opportunities to develop knowledge of emerging technologies in thermal engineering, such as renewable energy sources, to evaluate their potential impact on thermal systems.

CO Attainment and Corrective Actions for further improvements.

		Cycle - 1 (2016-17 to 2019-20)							
Course Code	Course	CO1	CO2	CO3	CO4	CO5	CO6	CO Target	
First Year (2016-17)									
101005	Basic Civil and Environmental Engineering	2.40	2.36	2.24	2.24	1.79	1.69		
101011	Engg Mechanics	1.56	1.55	1.56	1.48	1.67	1.65		
101013	Basic Mechanical Engg	2.41	2.05	1.91	2.07	1.89	1.79		
102006	Engineering Graphics - I	1.90	1.80	1.90	1.90	1.63	1.47		
102014	Engineering Graphics II	2.91	2.91	2.91	2.91	2.91	2.91		
103004	Basic Electrical Engineering	1.90	1.87	1.68	1.84	1.68	1.67		
104012	Basic Electronics Engg.	2.12	2.09	1.94	1.94	1.71	1.69		
107001	Engineering Mathematics - I	2.44	2.42	1.87	1.87	1.53	1.53		
107002	Engineering Physics	2.04	1.99	2.11	2.19	1.55	1.54		
107008	Engineering Mathematics - II	1.94	1.91	1.19	1.19	0.89	0.89		
107009	Engineering Chemistry	1.37	1.34	1.10	1.34	1.07	1.07		
110003	Fundamentals of Programming Language - I	1.44	1.44	1.46	1.46				
110010	Fundamentals of Programming Language-II	1.13	1.13	1.51	1.51				
111007	Workshop	2.94	2.94	2.94	2.94				
Second Year (2017-18)	Courses	CO1	CO2	CO3	CO4	CO5	CO6	Target for Current Cycle	Target for Next Cycle
202041	Manufacturing Processes I	1.63	1.66	1.59	1.55	2.07	2.04	1.50	1.75
202042	Computer Aided Machine Drawing	2.94	2.92	2.90	2.94	2.94	2.96	2.50	2.75
202043	Thermodynamics	1.71	1.71	1.69	1.73	2.18	2.15	1.50	1.85
202044	Material Science	1.47	1.46	1.50	1.37	1.50	1.47	1.20	1.45
202045	Fluid Mechanics	1.49	1.52	1.19	1.19	1.91	1.89	1.20	1.20
202047	Soft Skills	2.93	2.89	2.91	2.94	2.94	2.92	2.50	2.75
202048	Theory of Machines -I	1.56	1.54	1.50	1.58	1.58	1.55	1.50	1.55
202049	Engineering Metallurgy	1.10	1.07	1.32	1.29	0.99	0.98	1.20	1.20
202050	Applied Thermodynamics	1.66	1.65	1.62	1.67	1.79	1.74	1.50	1.70
202051	Strength of Materials	1.53	1.50	1.51	1.54	1.42	1.41	1.20	1.50
202053	Machine Shop – I	2.92	2.89	2.89	2.93			2.50	2.75
203152	Electrical and Electronics Engineering	1.55	1.53	1.55	1.60	1.53	1.48	1.20	1.55
207002	Engineering Mathematics - III	1.48	1.46	1.61	1.63	1.73	1.71	1.20	1.60
Third Year (2018-19)	Courses	CO1	CO2	CO3	CO4	CO5	CO6	Target for Current Cycle	Target for Next Cycle
302041	Design of Machine Element-I	1.54	1.54	1.55	1.52	1.48	1.52	1.20	1.50
302042	Heat Transfer	1.71	1.71	1.78	1.47	1.43	1.45	1.20	1.60
302043	Theory of Machines II	1.34	1.34	1.36	1.68	1.64	1.67	1.20	1.50
302044	Turbo Machines	0.92	0.92	0.94	0.97	0.94	0.97	1.20	1.20
302045	Metrology and Quality Control	1.50	1.46	1.52	1.56	1.52	1.56	1.20	1.50
302046	SKILL DEVELOPMENT	2.92	2.90	2.91	2.93	2.91	2.93	2.50	2.75
302047	Numerical Methods & Optimization	2.22	2.18	2.17	2.59	2.58	2.62	1.75	2.40
302048	Design of Machine Elements II	1.93	1.92	1.96	1.75	1.72	1.75	1.50	1.80
302049	Refrigeration and Air conditioning	1.83	1.80	1.86	1.16	1.13	1.15	1.20	1.20
302050	Mechatronics	1.83	1.80	1.84	1.65	1.62	1.65	1.50	1.70
302051	Manufacturing Process-II	1.50	1.43	1.45	1.69	1.68	1.72	1.20	1.55
302052	MACHINE SHOP II	2.94	2.92	2.91	2.92			2.50	2.75
302053	Seminar	2.92	2.91	2.91	2.92	2.90	2.93	2.50	2.75
Final Year (2019 - 20)	Courses	CO1	CO2	CO3	CO4	CO5	CO6	Target for Current Cycle	Target for Next Cycle
402041	Hydraulics and Pneumatics	2.27	2.28	2.28	2.29	2.32	2.27	2.00	2.25
402042	CAD/CAM and Automation	2.24	2.29	2.61	2.29	2.04	2.01	2.00	2.25
402043	Dynamics of Machinery	2.08	2.11	2.00	1.63	1.70	1.68	1.50	1.80
402046	Project - I	2.92	2.92	2.91	2.92	2.94	2.92	2.50	2.75
402047	Energy Engineering	2.59	2.66	2.59	2.91	2.96	2.92	2.00	2.70
402048	Mechanical System Design	2.93	2.92	2.75	2.94	2.92	2.90	2.00	2.75
402051	Project - II	2.92	2.91	2.92	2.94	2.92	2.91	2.50	2.75

The CO attainment values for CO1-CO6 and the target values set for them provide insight into the level of achievement of the learning outcomes defined for each course. The revised target values

give an idea of the level of improvement expected in the next cycle of the course.

Second Year Courses

On analyzing the table, it can be observed that the CO attainment values for some courses are significantly lower than the target values, such as Engineering Metallurgy, Material Science, and Fluid Mechanics. These courses require more focused attention in the next academic year, and appropriate corrective actions need to be taken to bridge the gap between the attainment values and target values.

On the other hand, courses such as Computer-Aided Machine Drawing, Soft Skills, and Machine Shop - I and other courses have CO attainment values that are either close to or exceeding the target values. These courses can be considered as strengths, and their teaching methods and practices can be adopted in other courses to achieve better outcomes.

Based on the corrective actions suggested earlier, here are some specific recommendations for each course or group of courses:

a. CO Attainment values are greater than set Target values and Target for next academic year is increased. Following are the subjects:

Manufacturing Processes I Soft Skills

Computer Aided Machine Drawing Theory of Machines -I

Thermodynamics Applied Thermodynamics

Electrical and Electronics Engineering Engineering Mathematics – III

Strength of Materials Machine Shop – I

The CO attainment values for certain subjects have fallen short of the set target values. However, the target for the next academic year remains the same. Corrective measures are recommended for these subjects.

1. Material Science:

- Increase the number of practical exercises and demonstrations to help students understand the practical applications of the course material.
- Provide additional resources such as study materials and tutoring services to help students who may be struggling with the course material.

2. Fluid Mechanics:

- Increase the use of visualization aids such as animations and videos to help students understand the concepts better.

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- Provide additional practice exercises to improve student performance in weak areas.

3. Engineering Metallurgy:

- Increase the use of visualization aids such as diagrams and models to help students understand the concepts better.
- Provide additional practice exercises to improve student performance in weak areas.

Third Year Courses

a. The following list shows the subjects where CO attainment has exceeded the set target and target for next academic year is increase.

Design of Machine Element I Numerical Methods & Optimization

Heat Transfer Design of Machine Elements II

Theory of Machines II Mechatronics

Metrology and Quality Control Manufacturing Process-II

Skill Development Machine Shop II

Seminar

b. In certain subjects, the CO attainment values have not met the set target values. Although the target for the next academic year remains the same, corrective measures are advised for these subjects.

Turbo Machines

- Review and revise the course material: Evaluate the course material to ensure it is aligned with the learning objectives and adequately covers the required topics. If necessary, revise the course material to address any gaps or areas of weakness.
- Provide additional resources and support: Offer additional resources such as textbooks, study guides, or online tutorials to help students better understand the course material. Provide extra support through mentoring to help struggling students.
- Incorporate more interactive and engaging learning activities: Introduce more interactive learning activities such as case studies, or simulations to help students apply the course concepts in real-world scenarios. This can improve their understanding and retention of the material.
- Assess the teaching methodology: Evaluate the teaching methodology used in the course to ensure it is effective and engaging. Consider using different teaching methods such as flipped classrooms or active learning to better engage students and promote their understanding of the

material.

Refrigeration and Air conditioning

- Provide additional resources and support: Offer additional resources such as textbooks, study guides, or online tutorials to help students better understand the course material.
- Incorporate more hands-on learning activities: Introduce more hands-on learning activities such as lab experiments, field trips, or workshops to help students apply the course concepts in practical settings. This can improve their understanding and retention of the material.
- Assess the teaching methodology: Evaluate the teaching methodology used in the course to ensure it is effective and engaging. Consider using different teaching methods such as project-based learning or peer teaching to better engage students and promote their understanding of the material.
- Improve the assessment process: Review the assessment process to ensure it aligns with the course objectives and accurately measures student understanding of the material.
- Provide industry exposure: Provide students with opportunities to interact with professionals in the field, attend industry seminars/webinar, and participate in internships to better understand the practical applications of the course material.

Final Year Courses

The CO attainment values for all courses are higher than the target values set. This suggests that the course is doing well in terms of meeting the expected outcomes. Target are revised for the next academic year.

However, to ensure continuous improvement, the course could incorporate more practical examples and real-world applications of Hydraulics and Pneumatics to enhance students' understanding.

Another action that could be taken is to provide more hands-on experience with CAD/CAM and Automation software and tools. This would allow students to apply the theoretical concepts they are learning in class to real-world problems and better prepare them for future careers in the field. Additionally, providing opportunities for students to work on group projects and collaborate with industry professionals could further enhance their learning experience.

Provide opportunities for students to work on real-world projects with industry partners, which will enable them to apply their learning in a practical setting and enhance their problem-solving skills.

Encourage students to conduct research on their own and come up with innovative ideas for their project work. This will foster creativity and independent thinking among students.

Provide training to students on project management skills, including planning, scheduling, and budgeting. This will help them manage their projects effectively and deliver them on time and within budget.

Provide more opportunities for hands-on experience with energy engineering equipment, tools, and software. This could be achieved by incorporating lab sessions, industrial visits, and internships.

Encouraging students to collaborate with each other and discuss their ideas and solutions could help them gain different perspectives and improve their problem-solving skills.

Observation and actions taken based on the results of POs /PSO

POs Attainment Levels and Actions for Improvement- (2020-21)

PO 1: Engineering Knowledge

Target Level	**1.70**	**Attainment Level**	**1.75**

Observations

Attainment is met to the target value. Still the courses which need attention are: Manufacturing Processes I, Material Science, Fluid Mechanics, Engineering Metallurgy, Applied Thermodynamics, Electrical and Electronics Engineering, Turbo Machines. The students faced difficulty to understand basic concepts of the courses. Following actions are suggested:

Action 1: Provide additional training and support to students and faculty, viz. tutoring, workshops, or mentoring in order to help them acquire the requisite knowledge. Relevant online platforms to be suggested to further strengthen the fundamental knowledge.

Action 2: Increase emphasis on fundamental concepts in the curriculum will help students develop a strong foundation in engineering knowledge and better prepare them for advanced concepts.

Action 3: Incorporate project-based learning to help students apply their engineering knowledge in real-world scenarios and improve their understanding of the subject matter.

Action 4: Provide opportunities for hands-on experience which will help students develop practical skills and apply their engineering knowledge in a meaningful way.

Action 5: Collaborate with industry experts to ensure that the program aligns with the current industry requirements, and the students are trained in the latest industry-relevant skills.

PO 2: Problem Analysis

Target Level	**1.42**	**Attainment Level**	**1.44**

Observations

Attainment is marginally met, hence the courses having scope of improvement are identified as Manufacturing Processes I, Material Science, Fluid Mechanics, Engineering Metallurgy, Applied Thermodynamics, Electrical and Electronics Engineering, Engineering Mathematics – III and Turbo Machines. These courses need better understanding through practical knowledge and sound basics. The following actions are to be conducted:

Action 1: Provide additional training (online and/or offline) and support to students and

faculty by tutoring, workshops, or mentoring to help them acquire the required problem analysis skills.

Action 2: Emphasize critical thinking skills in the curriculum to help students develop the ability to analyze complex problems and generate effective solutions.

Action 3: Incorporate case studies and simulations to provide students with practical problem-solving experience and help them develop their problem analysis skills.

Action 4: Provide opportunities for teamwork to help students develop their problem analysis skills by working collaboratively with others and considering multiple perspectives.

PO 3: Design/development of Solutions

Target Level	**1.30**	**Attainment Level**	**1.31**

Observations

Target value is attained. Still there is a room for improvement for some courses. viz. Applied Thermodynamics, Turbo Machinery. These kinds of courses need more practice and students need more practice on calculations and derivations related questions. It is proposed to conduct following actions:

Action 1: Provide additional training and support to students viz. tutoring, workshops, or mentoring to help them acquire the design and development skills thorough online and offline mode.

Action 2: Incorporate project-based learning to help students apply their design and development skills in real-world scenarios and improve their understanding of the subject matter.

Action 3: Provide opportunities for hands-on experience to help students develop practical skills and apply their design and development knowledge in a meaningful way.

Action 4: Emphasize innovation and creativity to help students develop novel solutions to complex problems.

Action 5: Collaborate with industry experts to help ensure that the program aligns with the current industry requirements, and the students are made aware regarding the latest industry-relevant skills.

PO 4: conduct Investigations of Complex Problems

Target Level	1.35	Attainment Level	1.42

Observations

Target value is attained. There is a need to concentrate on Thermodynamics, Applied Thermodynamics, Fluid Mechanics, Theory of Machines I, Theory of Machines II. It is essential to prepare mindset towards investigation if the problems seem difficult for few students, hence following activities are recommended:

Action 1: provide additional training and support to students and faculty through tutoring, workshops, or mentoring to help them acquire the required investigation skills.

Action 2: incorporate research-based learning to help students develop their investigation skills by applying the scientific method to complex problems.

Action 3: emphasize critical thinking skills to help students develop the ability to investigate complex problems and generate effective solutions.

Action 4: provide opportunities for hands-on experience to help students develop practical investigation skills and apply their knowledge in a meaningful way through V lab and NPTEL and other Youtube videos.

Action 5: collaborate with industry experts to help ensure that the program aligns with the current industry requirements.

PO 5: Modern Tool Usage

Target Level	1.45	Attainment Level	1.53

Observations

The Target value is attained. To strengthen the courses Design of Machine Elements I, Design of Machine Elements II, CAD/CAM and Automation and Dynamics of Machinery; following action are to be taken:

Action 1: conduct an assessment to identify the reasons why the target for modern tool usage is not being met. This assessment could include analyzing data related to tool usage, conducting surveys.

Action 2: identify barriers from the assessment that are preventing the target from being met. These barriers could include lack of inadequate resources, or inadequate tool functionality.

Action 3: communicate the importance of modern tool usage to students and emphasize the benefits. This will help to create a culture that values and promotes the use of modern tools.

Action 4: provide training to student and faculty to ensure that they have the skills and knowledge required to use the modern tools effectively, for this V lab and NPTEL or other Youtube videos to be used.

PO 6: The Engineer and Society

Target Level	**1.45**	**Attainment Level**	**1.51**

Observations

The Target value is attained. The courses Applied Thermodynamics, Engineering Metallurgy and Turbo Machines have scope where students need to indulge in applying their learned knowledge in practical circumstances; maybe in small groups. The actions indicated are:

Action1: identify barriers that are preventing the target from being met, such as lack of emphasis on social and ethical considerations, inadequate student engagement with real-world societal issues, limited opportunities for students to engage in community service and outreach activities.

Action 2: develop an action plan to address the barriers identified in the assessment. This plan should include specific actions that need to be taken, timelines for completion, and responsible parties.

Action 3: ensure adequate resources, such as funding, staff, and time, are allocated to implement the action plan.

Action 4: include a greater emphasis on social and ethical considerations in engineering practice such as integration of case studies that demonstrate the impact of engineering on society, discussions of ethical frameworks and decision-making, and opportunities for students to engage in interdisciplinary projects that address real-world societal issues like recovering from the effects of the pandemic.

Action 4: foster community engagement by providing offline/online opportunities for students to engage in community service or outreach activities viz. service learning projects that address community needs, participation in engineering-related community events, or collaboration with local non-profit organizations.

PO 7: Environment and Sustainability

Target Level	1.55	Attainment Level	1.67

Observations

The attainment of the target is met, the courses Heat Transfer and Mechatronics have a compelling need to make students aware about the Sustainable Development Goals (SDG). Capturing the attainment of the same is a challenge as being an affiliated Institute curriculum is not designed accordingly. Reasons for the same are absence of chance to frame questions in University exams and Partial student participation. To overcome the lacuna, following actions are pointed:

Action 1: identify barriers that are preventing the target from being met. The barriers such as lack of emphasis on environmental and sustainability considerations in program curriculum, inadequate student engagement with environmental issues and limited opportunities for students to engage in sustainability-focused research or projects.

Action 2: develop an action plan to address the barriers identified in the assessment. This plan includes specific actions that need to be taken, timelines for completion, and responsible parties.

Action 3: foster student engagement with environmental issues by providing opportunities for students to engage in sustainability-focused projects, including projects related to renewable energy or sustainable design, participation in sustainability-focused competitions, or collaboration with local organizations working on sustainability issues.

PO 8: Ethics

Target Level	1.90	Attainment Level	1.82

Observations

The target of attainment value is 95.62%. The courses Soft Skills, Skill Development and Seminar have to largely take of care-off ethics through stated actions:

Action 1: conduct an assessment to identify the reasons why the target for "Ethics" program outcome is not being met. This assessment includes analyzing data related to student performance and conducting surveys with students.

Action 2: identify barriers on ethics in program curriculum, inadequate student engagement with ethical issues, and limited opportunities for students to engage in ethics-focused activities.

Action 3: include greater emphasis on ethics in engineering practice like integration of case studies that demonstrate the importance of ethics in engineering, discussions of ethical frameworks and decision-making, and opportunities for students to engage in ethics-focused activities.

Action 4: foster student engagement with ethical issues by providing opportunities for students to engage in ethics-focused activities, viz. debates or discussions on ethical issues in engineering, participation in ethics-related competitions, or collaboration with local organizations working on ethical issues.

PO 9: Individual and Team Work

Target Level	**1.55**	**Attainment Level**	**1.59**

Observations

The Target value is attained. Attempts to be made for enhancement of the courses Soft Skills, Design of Machine Elements I, Design of Machine Elements II, Seminar, Project I and Project II. The actions put forward are:

Action 1: conduct an assessment to identify the reasons why the target is not being met, by analyzing data related to student performance and conducting surveys of students.

Action 2: identify barriers on individual and team work in program curriculum, inadequate student engagement with teamwork issues, and limited opportunities for students to engage in team-based projects.

Action 3: develop an action plan to address the barriers identified in the assessment including specific actions that need to be taken, timelines for completion, and responsible parties.

Action 4: include a greater emphasis on individual and team work while delivering the course contents on engineering practice like integration of case studies that demonstrate the importance of individual and team work in engineering, discussions of teamwork dynamics and conflict resolution, and opportunities for students to engage in team-based projects.

Action 5: foster student engagement with individual and team work issues by providing opportunities for students to engage in team-based projects that require collaboration and communication, and working in diverse teams.

Action 6: increase faculty training on individual and team work in engineering practice. This could include workshops or training sessions focused on teamwork dynamics, conflict resolution, or integrating individual and team work into course content.

PO 10: Communication

Target Level	1.40	Attainment Level	1.51

Observations

The Target value is attained. Increasing the participation of students in Team work activities is needed to boost effective communication in the courses Material Science and Engineering Metallurgy. To enhance effective communication following actions are urged:

Action 1: conduct an assessment to identify the reasons why the target is not being met, by analyzing data related to student performance and conducting surveys.

Action 2: identify barriers that are preventing the target from being met, such as lack of emphasis on communication in program curriculum, inadequate student engagement with communication issues, and limited opportunities for students to engage in communication-focused activities.

Action 3: develop an action plan to address the barriers identified in the assessment such as specific actions that need to be taken, timelines for completion, and responsible parties.

Action 4: include a greater emphasis on communication in engineering practice, like integration of case studies that demonstrate the importance of communication in engineering, discussions of effective communication strategies and techniques, and opportunities for students to engage in communication-focused activities, effective use of virtual platforms.

Action 5: foster student engagement with communication issues by providing opportunities for students to engage in communication-focused activities; including presentations, technical writing assignments, or team-based projects that require clear and effective communication.

PO 11: Project Management and Finance

Target Level	1.40	Attainment Level	1.52

Observations

This PO is attained, to strengthen the Manufacturing Processes I course following actions are suggested:

Action 1: conduct an assessment to identify the reasons why the target for "Project Management and Finance" program outcome is not being met. This assessment includes analyzing data related to student performance and conducting surveys.

Action 2: identify barriers on project management and finance in program curriculum, inadequate student engagement with project management and finance issues, or limited

opportunities for students to engage in project management and finance-focused activities.

Action 3: develop an action plan to address the barriers identified in the assessment, including specific actions that need to be taken, timelines for completion, and responsible parties.

Action 4: include a greater emphasis on project management and finance in engineering practice, by the integration of case studies that demonstrate the importance of project management and finance in engineering, discussions of effective project management strategies and finance management techniques, and opportunities for students to engage in project management and finance-focused activities.

Action 5: foster student engagement with project management and finance issues by providing opportunities for students to engage in project management and finance-focused activities, such as projects that require students to create project plans, manage budgets, and analyze financial data.

Action 6: increase faculty training on project management and finance in engineering practice, like workshops or training sessions focused on effective project management strategies and finance management techniques, or integrating project management and finance skills into course content.

PO 12: Life-long Learning

Target Level	**1.30**	**Attainment Level**	**1.24**

Observations

Attainment of the target is 95.11% of target value. Students need to realize that learning is a never ending process, hence need to concentrate on the courses Material Science, Fluid Mechanics and Applied Thermodynamics through the following actions:

Action 1: conduct an assessment to identify the reasons why the target for "Life-long learning" program outcome is not being met, viz. analyzing data related to student performance, conducting surveys or interviews with students.

Action 2: identify barriers on life-long learning in program curriculum, inadequate student engagement with life-long learning issues, or limited opportunities for students to engage in life-long learning-focused activities.

Action 3: develop an action plan to address the barriers identified in the assessment, by including specific actions that need to be taken, timelines for completion, and responsible parties.

Action 4: include a greater emphasis on life-long learning in engineering practice through the integration of continuing education and professional development opportunities, discussions of the importance of life-long learning in engineering practice, and opportunities for students to engage in life-long learning-focused activities.

Action 5: foster student engagement with life-long learning issues by providing opportunities for students to engage in life-long learning-focused activities, through seminars, workshops, or training sessions focused on developing skills for life-long learning, such as critical thinking, problem-solving, and self-directed learning.

PSO 1: Our graduates will have competencies in usage of modern tools to optimally design, develop and manufacture product and/or process.

Target Level	**1.45**	**Attainment Level**	**1.57**

Observations

Attainment is surpassing the target value. Courses which need to be pondered are Computer Aided Machine Drawing, Energy Engineering and Mechanical System Design. As the Institute is affiliated to University, there are limitations on framing questions in university papers. Students do not get much opportunity to practically design for actual/ industrial project(s).

Action 1: Conduction of Expert lectures to overcome the lacunae of students' awareness about mechanical elements and systems.

Action 2: Facilitating the knowledge gain through mini-projects, projects, Project based learning, internship, industrial visits.

Action 3: Exploration of different manufacturing processes such as 3D printing, CNC machining, to understand their capabilities and limitations in producing mechanical parts and systems.

PSO 2: Our graduates will have incremental skills to enhance employability in the automotive and thermal engineering fields.

Target Level	**1.50**	**Attainment Level**	**1.69**

Observations

Attainment is fully met. The course which needs consideration are Engineering Metallurgy and Manufacturing Processes. Students have theoretical knowledge and have limitations to

perform in the practical industrial concerns.

Action 1: Facilitating, promoting and motivating students to undergo Internships in Industries

Action 2: Organizing Industrial visits and conduction of Expert lectures by inviting Alumni, Industrial professionals, Entrepreneurs to make students aware about the actual industrial practices.

Action 3: Providing opportunities to develop knowledge of emerging technologies in thermal engineering, such as renewable energy sources, to evaluate their potential impact on thermal systems.

Course Outcome of all courses for Cycle – 2 (2017-18 to 2020-21) are listed in table below:

		Cycle - 2 (2017-18 to 2020-21)							
Course Code	**Course**	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**CO Target**	
First Year (2017-18)									
101005	Basic Civil and Environmental Engineering	2.38	2.37	2.11	2.11	1.62	1.39		
101011	Engg Mechanics	1.44	1.41	1.44	1.43	1.55	1.44		
101013	Basic Mechanical Engg	1.55	1.53	1.55	1.55	1.68	1.49		
102006	Engineering Graphics - I	2.21	2.20	2.23	2.22	2.49	2.45		
102014	Engineering Graphics II	1.67	1.68	1.61	1.61	1.48	1.19		
103004	Basic Electrical Engineering	1.32	1.33	1.41	1.38	1.43	1.19		
104012	Basic Electronics Engg.	2.88	2.88	2.85	2.87	2.88	3.00		
107001	Engineering Mathematics - I	1.92	1.92	1.61	1.56	1.57	1.34		
107002	Engineering Physics	1.70	1.65	1.71	1.69	1.29	1.03		
107008	Engineering Mathematics - II	1.24	1.23	1.12	1.11	1.11	0.80		
107009	Engineering Chemistry	1.61	1.56	1.61	1.59	1.29	1.03		
110003	Fundamentals of Programmimg Language - I	1.40	1.43	1.34	1.35				
110010	Fundamentals of Programming Language-II	1.39	1.39	1.11	1.12				
111007	Workshop	3.00	3.00	3.00	3.00				
Second Year(2018-19)	**Course**	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**Target for Current Cycle**	**Target for Next Cycle**
202041	Manufacturing Processes I	1.07	1.07	1.08	1.01	0.50	0.49	1.75	1.75
202042	Computer Aided Machine Drawing	2.89	2.90	2.90	2.87	2.89	2.89	2.75	2.85
202043	Thermodynamics	1.62	1.61	1.60	1.86	1.92	1.92	1.85	1.85
202044	Material Science	1.42	1.41	1.44	1.46	1.40	1.39	1.45	1.45
202045	FLUID MACHANICS	1.23	1.23	1.21	0.50	1.73	0.82	1.20	1.20
202047	Soft Skills	2.89	2.87	2.88	2.91	2.88	2.89	2.75	2.85
202048	Theory of Machines -I	1.86	1.81	1.87	1.89	1.73	1.70	1.55	1.80
202049	Engineering Metallurgy	1.07	1.03	1.08	1.07	1.33	1.67	1.20	1.20
202050	Applied Thermodynamics	1.43	1.37	1.45	1.52	1.39	1.38	1.70	1.70
202051	Strength of Materials	1.57	1.51	1.46	1.55	1.55	1.51	1.50	1.50
202053	Machine Shop – I	2.89	2.85	2.91	2.91			2.75	2.85
203152	Electrical and Electronics Engineering	1.27	1.27	1.27	1.25	1.38	1.45	1.55	1.55
207002	Engineering Mathematics - III	1.59	1.58	1.61	1.57	1.67	1.75	1.60	1.60
Third Year(2019-20)	**Course**	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**Target for Current Cycle**	**Target for Next Cycle**
302041	Design of Machine Element-I	1.92	1.95	1.87	1.91	1.91	1.92	1.50	1.90
302042	Heat Transfer	1.56	1.54	1.54	1.31	1.32	1.36	1.60	1.60
302043	Theory of Machines II	2.03	1.88	2.00	2.01	2.02	1.98	1.50	2.00
302044	Turbo Machines	1.25	1.25	1.42	1.43	1.43	1.37	1.20	1.35
302045	Metrology and Quality Control	1.78	1.68	1.75	1.51	1.67	1.59	1.50	1.65
302046	SKILL DEVELOPMENT	2.89	2.87	2.92	2.90	2.87	2.90	2.75	2.85
302047	Numerical Methods & Optimization	2.83	2.83	2.90	2.90	2.91	2.80	2.40	2.85
302048	Designe of Machine Elements II	2.13	2.26	2.27	2.25	2.24	2.27	1.80	2.20
302049	Refrigeration and Air conditioning	2.35	2.40	2.41	2.39	2.37	2.37	1.20	2.35
302050	Mechatronics	2.35	2.50	2.35	2.37	2.37	2.40	1.70	2.35
302051	Manufacturing Process-II	2.01	2.04	2.14	1.95	1.76	1.77	1.55	1.90
302052	MACHINE SHOP II	2.87	2.91	2.93	2.90			2.75	2.90
302053	Seminar	2.84	2.91	2.89	2.94	2.91	2.91	2.75	2.90
Final Year(2020-21)	**Course**	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**Target for Current Cycle**	**Target for Next Cycle**
402041	Hydraulics and Pneumatics	2.90	2.92	2.90	2.91	2.96	2.92	2.25	2.90
402042	CAD/CAM and Automation	2.85	2.85	2.78	2.72	2.77	2.74	2.25	2.75
402043	Dynamics of Machinary	2.91	2.92	2.68	2.88	2.72	2.73	1.80	2.80
402046	Project - I	2.89	2.93	2.85	2.91	2.89	2.85	2.75	2.90
402047	Energy Engineering	2.87	2.92	2.90	2.90	2.89	2.87	2.70	2.90
402048	Mechanical System Design	2.91	2.84	2.92	2.94	2.92	2.91	2.75	2.90
402051	Project - II	2.89	2.93	2.91	2.89	2.88	2.88	2.75	2.90

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CO Attainment and Corrective Actions for further improvements.

It is essential to analyze the individual CO attainment values for each course. Based on this analysis, the courses are categorized in three groups:

A. For courses with CO attainment values below target levels, faculty members should review the course content and teaching methodologies to identify areas of improvement. They can also provide additional support and resources, such as extra classes or online resources, to help students improve their understanding of the course material.

B. For courses with CO attainment values exceeding the target levels, faculty members should identify the areas where students are performing well and incorporate more challenging assignments and projects to further enhance their skills and knowledge.

C. For courses with mixed CO attainment values, faculty members should review the course content and teaching methodologies to identify areas of improvement. They can also provide additional support and resources to students who are struggling to improve their CO attainment levels.

Second Year Courses:

A. After analysing the Course Outcome (CO) attainment values, it has been observed that the desired target value has not been achieved for most courses. This indicates that there is a need for corrective measures to improve the performance of the faculty and students in the next academic year.

To improve CO attainment levels, the following corrective measures can be suggested to faculties:

Reviewing and revising the course contents: The faculty members can review and revise the course contents to ensure that it aligns with the CO attainment targets. They can incorporate relevant topics and update the teaching methods to help students better understand the course objectives and achieve the desired CO attainment levels.

Enhancing teaching methods: The faculty members should enhance their teaching methods to make the learning experience more interactive and engaging for students. They can use a variety of teaching techniques such as case studies, group discussions, and project-based learning to help students apply their knowledge and skills to real-world scenarios.

Providing additional resources: The faculty members should ensure that the students have access to the necessary resources to achieve the desired CO attainment levels. This can include providing relevant textbooks, research materials, and specialized software tools.

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Conducting regular assessments: The faculty members should conduct regular assessments to monitor the CO attainment levels and identify areas where improvements are needed. This will help them take corrective actions to address any issues and improve the performance of the students.

Offering training and professional development: The faculty members should attend training and professional development sessions to enhance their teaching skills and stay up-to-date with the latest teaching methods and techniques.

By implementing these corrective measures, the performance of the faculty and students is expected to improve, and the desired CO attainment targets can be achieved.

For the following subjects some specific corrective actions are suggested as the CO attainment values are very low and all Cos are not achieved.

Manufacturing Processes I:

CO values for the course "Manufacturing Processes" are very low, the following corrective actions should be taken:

1. Identify the root cause: The first step is to identify the root cause of the low CO attainment levels. This should be done by analysing the feedback from students, conducting surveys, and reviewing the course material.
2. Enhance teaching methods: The faculty members should enhance their teaching methods by using a variety of teaching techniques such as case studies, hands-on activities, and simulations. This will help students apply their knowledge and skills to real-world scenarios.
3. Conduct regular assessments: Regular assessments should be conducted to monitor the CO attainment levels and identify areas where improvements are needed. This will help faculty members take corrective actions to address any issues and improve the performance of the students.
4. Provide additional resources: The faculty members should provide additional resources such as relevant textbooks, research materials, and specialized software tools to help students better understand the manufacturing processes.
5. Offer remedial sessions: Remedial sessions should be offered to help students who are struggling with the course material. These sessions should be conducted by the faculty members and can provide additional support to the students.

Applied Thermodynamics

the CO values for the course Applied Thermodynamics are very low, the following corrective actions can be taken:

Identify the root cause: The first step is to identify the root cause of the low CO attainment levels.

Revisit the course contents: Based on the analysis, the course contents can be revised to ensure that it aligns with the CO attainment targets. The faculty members can incorporate relevant topics and adjust the teaching methods to help students better understand the concepts of applied thermodynamics.

Enhance teaching methods: The faculty members should enhance their teaching methods by using a variety of teaching techniques such as demonstrations, interactive simulations, and problem-solving exercises. This will help students apply their knowledge and skills to real-world scenarios.

Conduct regular assessments: Regular assessments should be conducted to monitor the CO attainment levels and identify areas where improvements are needed. This will help faculty members take corrective actions to address any issues and improve the performance of the students.

Provide additional resources: The faculty members should provide additional resources such as relevant textbooks, research materials, and specialized software tools to help students better understand the concepts of applied thermodynamics.

Offer remedial sessions: Remedial sessions should be offered to help students who are struggling with the course material. These sessions should provide additional support to the students.

Collaborate with industry experts: The faculty members should collaborate with industry experts to provide practical insights and applications of the concepts of applied thermodynamics. This will help students better understand how the concepts are applied in the real-world scenarios.

Electrical and Electronics Engineering:

The CO values for the course Electrical and Electronics Engineering are very low, the following corrective actions can be taken:

Identify the root cause: The first step is to identify the root cause of the low CO attainment levels.

Enhance teaching methods: The faculty members should enhance their teaching methods by using a variety of teaching techniques such as interactive lectures, demonstrations, and hands-on activities.

Conduct regular assessments: Regular assessments should be conducted to monitor the CO attainment levels and identify areas where improvements are needed. This will help faculty

members take corrective actions to address any issues and improve the performance of the students.

Provide additional resources: The faculty members should provide additional resources such as relevant textbooks, research materials, and specialized software tools to help students better understand the concepts of electrical and electronics engineering.

Offer remedial sessions: Remedial sessions should be offered to help students who are struggling with the course material. These sessions should provide additional support to the students and help them catch up with the rest of the class.

Use real-world examples: The faculty members should use real-world examples to help students apply their knowledge of electrical and electronics engineering to practical scenarios. This will help students better understand the relevance of the course and its practical applications.

B. The CO attainment values for some subjects have fallen below their target levels. For certain courses, some of the CO attainment values are below target levels while others are above target levels. These courses include Thermodynamics, Material Science, Fluid Mechanics, Engineering Metallurgy, Engineering Mathematics – III, and Strength of Materials.

To improve the CO attainment levels for these courses, specific corrective measures must be taken based on the CO attainment values. For example, for courses with a few CO attainment values below the target level, faculty members can focus on improving teaching methodologies, providing additional resources, and increasing student engagement in those specific areas. Alternatively, for courses with several CO attainment values below the target level, a comprehensive review of the course curriculum and teaching methodologies may be required to identify areas for improvement. Faculty members should also consider providing additional support to struggling students, such as one-on-one tutoring or mentoring, and implementing more frequent assessments to monitor and address CO attainment issues throughout the academic year. With these corrective measures, the CO attainment levels for these courses can be improved.

C. The CO attainment values for some of the courses such as Computer Aided Machine Drawing, Soft Skills, Theory of Machines –I, and Machine Shop – I are greater than the target values, the target for the next academic year is increased, the following measures can be suggested to further improve the CO attainment:

Incorporate case studies: Case studies should be incorporated into the curriculum to help students apply their knowledge to real-world scenarios. This will help students develop problem-solving

skills and enhance their critical thinking abilities.

Use technology: Technology can be used to enhance the learning experience of the students. For example, Computer Aided Machine Drawing can be taught using additional CAD software, and Soft Skills can be taught through virtual simulations.

Offer hands-on experiences: Hands-on experiences should be offered to students to help them gain practical experience and develop their technical skills. For example, Machine Shop – I should be taught in a workshop environment, where students should use different machines to manufacture parts.

By implementing these measures, the performance of the faculty and students can be further improved, and the CO attainment levels for the courses such as Computer Aided Machine Drawing, Soft Skills, Theory of Machines –I, and Machine Shop – I can be increased even further, exceeding the target values set for the next academic year.

Third Year Courses:

The CO attainment levels for the third year courses of the program have achieved the set targets, with the exception of the course in Heat Transfer, where the target has not been met. For the courses Design of Machine Element-I, Theory of Machines II, Turbo Machines, Metrology and Quality Control, Skill Development, Numerical Methods & Optimization, Design of Machine Elements II, Refrigeration and Air conditioning, Mechatronics, Manufacturing Process-II, Machine Shop-II, and Seminar, the targets for the next academic year have been set to improve CO attainment levels.

To achieve these improved CO attainment targets, some common measures are suggested to the faculty. These include:

- Regular assessment and feedback mechanisms that provide students with opportunities to identify areas of weakness and take corrective action.
- Incorporation of innovative teaching methods, such as project-based learning, to increase student engagement and participation.
- Provision of additional resources, such as online resources and guest lectures, to enhance the learning experience.
- Encouragement of collaborative learning, where students can work together in groups to solve problems and share knowledge.

Additionally, for the course in Heat Transfer, the following corrective measures are suggested:

- Faculty members should review the content and teaching methodologies to identify areas of improvement and incorporate new teaching methods to enhance student understanding.
- Additional resources, such as tutorials and extra classes, can be provided to students who are struggling to improve their CO attainment levels.
- Regular assessment and feedback mechanisms can be implemented to help students identify areas of weakness and take corrective action.

By implementing these measures, the CO attainment levels for these courses can be improved, ensuring that students have a better understanding of the course material.

Final Year Courses:

The CO attainment levels for the final year courses of the program have successfully achieved the set targets. These courses include Hydraulics and Pneumatics, CAD/CAM and Automation, Dynamics of Machinery, Project, Energy Engineering, and Mechanical System Design. However, to further enhance the quality of education, the targets for these courses will be improved in the upcoming academic year.

To achieve the set targets for CO attainment, the following measures are suggested:

- Incorporation of practical and industry-based projects to provide students with hands-on experience in the application of course concepts.
- Adoption of innovative teaching methodologies, such as flipped classrooms and blended learning, to engage and motivate students to learn.
- Provision of additional resources, such as guest lectures, online resources, and workshops, to supplement classroom teaching.
- Regular assessment and feedback mechanisms to evaluate student performance and identify areas of improvement.
- Encouragement of collaborative learning and group activities to enhance student engagement and foster teamwork.
- Revision of course content to ensure that they are up-to-date and relevant to industry demands.
- Conducting regular faculty development programs to enhance their teaching skills and keep them updated with the latest teaching methodologies.
- Use of technology-enhanced learning tools such as simulations, virtual labs, and interactive multimedia content to make learning more engaging and effective.

- Collaboration with industry partners to provide students with opportunities for internships, industrial visits, and hands-on training.
- Creation of a peer-to-peer learning environment where students can exchange ideas and knowledge, and help each other in learning.
- Adoption of innovative assessment methods such as project-based assessments, case studies, and open-book exams to assess students' practical application of course concepts.

By implementing these measures, the CO attainment levels for these courses can be further improved, ensuring that students are better equipped with the knowledge and skills required to excel in their future careers.

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POs Attainment Levels and Actions for Improvement- (2021-22)

PO 1: Engineering Knowledge

Target Level	1.80	Attainment Level	2.04

Observations

Attainment is met to the target value. Still the courses which need attention are: Computer Aided Machine Drawing, Energy Engineering and Mechanical System Design. The students faced difficulty to understand basic concepts of the courses. Following actions are suggested:

Action 1: Provide additional training and support to students and faculty, viz. tutoring, workshops, or mentoring in order to help them acquire the requisite knowledge.

Action 2: Increase emphasis on fundamental concepts in the curriculum will help students develop a strong foundation in engineering knowledge and better prepare them for advanced concepts.

Action 3: Incorporate project-based learning to help students apply their engineering knowledge in real-world scenarios and improve their understanding of the subject matter.

Action 4: Provide opportunities for hands-on experience which will help students develop practical skills and apply their engineering knowledge in a meaningful way.

Action 5: Collaborate with industry experts to ensure that the program aligns with the current industry requirements, and the students are trained in the latest industry-relevant skills.

PO 2: Problem Analysis

Target Level	1.45	Attainment Level	1.73

Observations

Attainment is 98.82% of target value. The courses having scope of improvement are Manufacturing Processes I, Soft Skills, Energy Engineering and Mechanical System Design. These courses need better understanding through practical knowledge and sound basics. The following actions are to be conducted:

Action 1: Provide additional training and support to students and faculty by tutoring, workshops, or mentoring to help them acquire the required problem analysis skills.

Action 2: emphasize critical thinking skills in the curriculum to help students develop the ability to analyze complex problems and generate effective solutions.

Action 3: incorporate case studies and simulations to provide students with practical

problem-solving experience and help them develop their problem analysis skills.

Action 4: provide opportunities for teamwork to help students develop their problem analysis skills by working collaboratively with others and considering multiple perspectives.

PO 3: Design/development of Solutions

Target Level	**1.35**	**Attainment Level**	**1.57**

Observations

Target value is attained. Still there is a room for improvement for some courses. viz. Manufacturing Processes - I, Energy Engineering and Mechanical System Design. These kinds of courses need more practice and students need more practice on calculations and derivations related questions. It is proposed to conduct following actions:

Action 1: provide additional training and support to students viz. tutoring, workshops, or mentoring to help them acquire the design and development skills.

Action 2: incorporate project-based learning to help students apply their design and development skills in real-world scenarios and improve their understanding of the subject matter.

Action 3: provide opportunities for hands-on experience to help students develop practical skills and apply their design and development knowledge in a meaningful way.

Action 4: emphasize innovation and creativity to help students develop novel solutions to complex problems.

Action 5: collaborate with industry experts to help ensure that the program aligns with the current industry requirements, and the students are made aware regarding the latest industry-relevant skills.

PO 4 : Conduct Investigations of Complex Problems

Target Level	**1.45**	**Attainment Level**	**1.71**

Observations

Target value is attained. There is a need to concentrate on Soft Skills, Energy Engineering and Mechanical System Design. It is essential to prepare mindset towards investigation if the problems seem difficult for few students, hence following activities are recommended:

Action 1: provide additional training and support to students and faculty through tutoring, workshops, or mentoring to help them acquire the required investigation skills.

Action 2: incorporate research-based learning to help students develop their investigation

skills by applying the scientific method to complex problems.

Action 3: emphasize critical thinking skills to help students develop the ability to investigate complex problems and generate effective solutions.

Action 4: provide opportunities for hands-on experience to help students develop practical investigation skills and apply their knowledge in a meaningful way.

Action 5: collaborate with industry experts to help ensure that the program aligns with the current industry requirements.

PO 5: Modern Tool Usage 1.60/1.64

Target Level	**1.60**	**Attainment Level**	**1.64**

Observations

The Target value is attained. strengthen the courses Computer Aided Machine Drawing, Energy Engineering and Mechanical System Design; following action are to be taken:

Action 1: conduct an assessment to identify the reasons why the target for modern tool usage is not being met. This assessment could include analyzing data related to tool usage, conducting surveys.

Action 2: identify barriers from the assessment that are preventing the target from being met. These barriers could include lack of inadequate resources, or inadequate tool functionality.

Action 3: communicate the importance of modern tool usage to students and emphasize the benefits. This will help to create a culture that values and promotes the use of modern tools.

Action 4: Provide training to student and faculty to ensure that they have the skills and knowledge required to use the modern tools effectively.

PO 6: The Engineer and Society

Target Level	**1.55**	**Attainment Level**	**1.70**

Observations

The Target value is attained. The courses Skill Development and Mechanical System Design have scope where students need to indulge in applying their learned knowledge in practical circumstances; maybe in small groups. The actions indicated are:

Action 1: identify barriers that are preventing the target from being met, such as lack of emphasis on social and ethical considerations, inadequate student engagement with real-world societal issues, limited opportunities for students to engage in community service and outreach activities.

Action 2: develop an action plan to address the barriers identified in the assessment. This plan should include specific actions that need to be taken, timelines for completion, and responsible parties.

Action 3: ensure adequate resources, such as funding, staff, and time, are allocated to implement the action plan.

Action 4: include a greater emphasis on social and ethical considerations in engineering practice such as integration of case studies that demonstrate the impact of engineering on society, discussions of ethical frameworks and decision-making, and opportunities for students to engage in interdisciplinary projects that address real-world societal issues.

Action 5: foster community engagement by providing opportunities for students to engage in community service or outreach activities viz. service learning projects that address community needs, participation in engineering-related community events, or collaboration with local non-profit organizations.

PO 7: Environment and Sustainability

Target Level	**1.70**	**Attainment Level**	**1.81**

Observations

The attainment of the target is met, the course Refrigeration and Air conditioning have a compelling need to make students aware about the Sustainable Development Goals (SDG). Capturing the attainment of the same is a challenge as being an affiliated Institute curriculum is not designed accordingly. Reasons for the same are absence of chance to frame questions in University exams and Partial student participation. To overcome the lacuna, following actions are pointed:

Action 7: identify barriers that are preventing the target from being met. The barriers such as lack of emphasis on environmental and sustainability considerations in program curriculum, inadequate student engagement with environmental issues and limited opportunities for students to engage in sustainability-focused research or projects.

Action 8: develop an action plan to address the barriers identified in the assessment. This plan includes specific actions that need to be taken, timelines for completion, and responsible parties.

Action 9: Foster student engagement with environmental issues by providing opportunities for students to engage in sustainability-focused projects, including projects related to

renewable energy or sustainable design, participation in sustainability-focused competitions, or collaboration with local organizations working on sustainability issues.

PO 8: Ethics

Target Level	**1.90**	**Attainment Level**	**2.04**

Observations

The target of attainment value is met. The courses Soft Skills and Seminar have to largely taken care-off ethics through stated actions:

Action 1: conduct an assessment to identify the reasons why the target for "Ethics" program outcome is not being met. This assessment includes analyzing data related to student performance and conducting surveys with students.

Action 2: identify barriers on ethics in program curriculum, inadequate student engagement with ethical issues, and limited opportunities for students to engage in ethics-focused activities.

Action 3: include greater emphasis on ethics in engineering practice like integration of case studies that demonstrate the importance of ethics in engineering, discussions of ethical frameworks and decision-making, and opportunities for students to engage in ethics-focused activities.

Action 4: foster student engagement with ethical issues by providing opportunities for students to engage in ethics-focused activities, viz. debates or discussions on ethical issues in engineering, participation in ethics-related competitions, or collaboration with local organizations working on ethical issues.

PO 9: Individual and Team Work

Target Level	**1.65**	**Attainment Level**	**1.87**

Observations

The Target value is attained. Attempts to be made for enhancement of the courses Soft Skills, Seminar, Project I and Project II. The actions put forward are:

Action 1: conduct an assessment to identify the reasons why the target is not being met, by analyzing data related to student performance and conducting surveys of students.

Action 2: identify barriers on individual and team work in program curriculum, inadequate student engagement with teamwork issues, and limited opportunities for students to engage in team-based projects.

Action 3: develop an action plan to address the barriers identified in the assessment including specific actions that need to be taken, timelines for completion, and responsible parties.

Action 4: include a greater emphasis on individual and team work while delivering the course contents on engineering practice like integration of case studies that demonstrate the importance of individual and team work in engineering, discussions of teamwork dynamics and conflict resolution, and opportunities for students to engage in team-based projects.

Action 5: foster student engagement with individual and team work issues by providing opportunities for students to engage in team-based projects that require collaboration and communication, and working in diverse teams.

Action 6: increase faculty training on individual and team work in engineering practice. This could include workshops or training sessions focused on teamwork dynamics, conflict resolution, or integrating individual and team work into course content.

PO 10: Communication

Target Level	**1.55**	**Attainment Level**	**1.67**

Observations

The Target value is attained. Increasing the participation of students in Team work activities is needed to boost effective communication in the courses Manufacturing Processes I, Computer Aided Machine Drawing, Soft Skill and Project. To enhance effective communication following actions are urged:

Action 1: conduct an assessment to identify the reasons why the target is not being met, by analyzing data related to student performance and conducting surveys.

Action 2: identify barriers that are preventing the target from being met, such as lack of emphasis on communication in program curriculum, inadequate student engagement with communication issues, and limited opportunities for students to engage in communication-focused activities.

Action 3: develop an action plan to address the barriers identified in the assessment such as specific actions that need to be taken, timelines for completion, and responsible parties.

Action 4: include a greater emphasis on communication in engineering practice, like integration of case studies that demonstrate the importance of communication in engineering, discussions of effective communication strategies and techniques, and opportunities for students to engage in communication-focused activities.

Action 5: foster student engagement with communication issues by providing opportunities for students to engage in communication-focused activities; including presentations, technical writing assignments, or team-based projects that require clear and effective communication.

PO 11: Project Management and Finance

Target Level	**1.60**	**Attainment Level**	**1.47**

Observations

This PO is attained by 91.76%, to strengthen the Energy Engineering, Skill Development Project I and Project II courses; following actions are suggested:

Action 1: conduct an assessment to identify the reasons why the target for "Project Management and Finance" program outcome is not being met. This assessment includes analyzing data related to student performance and conducting surveys.

Action 2: identify barriers on project management and finance in program curriculum, inadequate student engagement with project management and finance issues, or limited opportunities for students to engage in project management and finance-focused activities.

Action 3: develop an action plan to address the barriers identified in the assessment, including specific actions that need to be taken, timelines for completion, and responsible parties.

Action 4: include a greater emphasis on project management and finance in engineering practice, by the integration of case studies that demonstrate the importance of project management and finance in engineering, discussions of effective project management strategies and finance management techniques, and opportunities for students to engage in project management and finance-focused activities.

Action 5: foster student engagement with project management and finance issues by providing opportunities for students to engage in project management and finance-focused activities, such as projects that require students to create project plans, manage budgets, and analyze financial data.

Action 6: increase faculty training on project management and finance in engineering practice, like workshops or training sessions focused on effective project management strategies and finance management techniques, or integrating project management and finance skills into course content.

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PO 12: Life-long Learning

Target Level	1.30	Attainment Level	1.55

Observations

Target of attainment is achieved. Students need to realize that learning is a never ending process, hence need to concentrate on the courses Mechanical System Design, Project I and Project II through the following actions:

Action 1: Conduct an assessment to identify the reasons why the target for "Life-long learning" program outcome is not being met, viz. analyzing data related to student performance, conducting surveys or interviews with students.

Action 2: Identify barriers on life-long learning in program curriculum, inadequate student engagement with life-long learning issues, or limited opportunities for students to engage in life-long learning-focused activities.

Action 3: Develop an action plan to address the barriers identified in the assessment, by including specific actions that need to be taken, timelines for completion, and responsible parties.

Action 4: Include a greater emphasis on life-long learning in engineering practice through the integration of continuing education and professional development opportunities, discussions of the importance of life-long learning in engineering practice, and opportunities for students to engage in life-long learning-focused activities.

Action 5: Foster student engagement with life-long learning issues by providing opportunities for students to engage in life-long learning-focused activities, through seminars, workshops, or training sessions focused on developing skills for life-long learning, such as critical thinking, problem-solving, and self-directed learning.

PSO 1: Our graduates will have competencies in usage of modern tools to optimally design, develop and manufacture product and/or process.

Target Level	1.45	Attainment Level	1.57

Observations

Attainment is surpassing the target value. Courses which need to be pondered are Computer Aided Machine Drawing, Energy Engineering and Mechanical System Design. As the Institute is affiliated to University, there are limitations on framing questions in university

papers. Students do not get much opportunity to practically design for actual/ industrial project(s).

Action 1: Conduction of Expert lectures to overcome the lacunae of students' awareness about mechanical elements and systems.

Action 2: Facilitating the knowledge gain through mini-projects, projects, Project based learning, internship, industrial visits.

Action 3: Exploration of different manufacturing processes such as 3D printing, CNC machining, to understand their capabilities and limitations in producing mechanical parts and systems.

PSO 2: Our graduates will have incremental skills to enhance employability in the automotive and thermal engineering fields.

Target Level	**1.50**	**Attainment Level**	**1.69**

Observations

Attainment is fully met. The course which needs consideration are Engineering Metallurgy and Manufacturing Processes. Students have theoretical knowledge and have limitations to perform in the practical industrial concerns.

Action 1: Facilitating, promoting and motivating students to undergo Internships in Industries

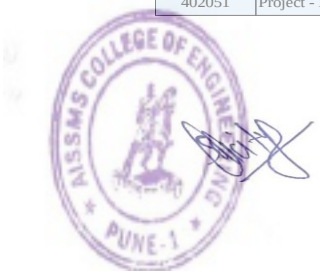
Action 2: Organizing Industrial visits and conduction of Expert lectures by inviting Alumni, Industrial professionals, Entrepreneurs to make students aware about the actual industrial practices.

Action 3: Providing opportunities to develop knowledge of emerging technologies in thermal engineering, such as renewable energy sources, to evaluate their potential impact on thermal systems

Action 4: Conduction of Expert Lectures (online/offline) of the experts in order to develop understanding of thermodynamics and heat transfer principles to analyze and evaluate the performance of thermal systems.

Course Outcome of all courses for Cycle – 3 (2018-19 to 2021-22) are listed in table below:

		Cycle - 3 (2018-19 to 2021-22)						
Course Code	**Course**	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**CO Target**
	First Year(2018-19)							
101005	Basic Civil and Environmental Engineering	2.23	2.21	2.17	2.17	1.55	1.54	
101011	Engg Mechanics	1.51	1.51	1.45	1.45	1.48	1.47	
101013	Basic Mechanical Engg	1.79	1.78	1.77	1.77	1.44	1.44	
102006	Engineering Graphics - I	1.58	1.57	1.52	1.52	1.50	1.48	
102014	Engineering Graphics II	2.89	2.89	2.89	2.89	2.89	2.89	
103004	Basic Electrical Engineering	1.59	1.42	1.46	1.46	1.70	1.69	
104012	Basic Electronics Engg.	1.59	1.58	1.59	1.59	1.71	1.69	
107001	Engineering Mathematics - I	1.75	1.73	1.47	1.47	1.68	1.67	
107002	Engineering Physics	1.42	1.42	1.42	1.42	1.55	1.54	
107008	Engineering Mathematics - II	1.31	1.31	1.22	1.22	1.37	1.37	
107009	Engineering Chemistry	1.63	1.62	1.55	1.55	1.65	1.63	
110003	Fundamentals of Programmimg Language - I	1.40	1.40	1.40	1.40			
110010	Fundamentals of Programming Language-II	1.42	1.42	1.42	1.42			
111007	Workshop	2.94	2.94	2.94	2.94			
Second Year(2019-20)	**Course**	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**Target for Current Cycle**
202041	Manufacturing Processes I	1.64	1.78	1.64	1.69	1.51	1.55	1.75
202042	Computer Aided Machine Drawing	2.48	2.47	2.50	2.50	2.49	2.50	2.85
202043	Thermodynamics	1.85	1.86	1.86	2.01	2.04	2.05	1.85
202044	Material Science	2.56	2.52	2.62	2.60	1.97	1.97	1.45
202045	FLUID MACHANICS	2.89	2.90	2.91	2.91	2.91	2.89	1.20
202047	Soft Skills	2.88	2.90	2.90	2.89	2.89	2.89	2.85
202048	Theory of Machines -I	2.91	2.92	2.91	2.90	2.92	2.92	1.80
202049	Engineering Metallurgy	2.90	2.91	2.90	2.92	2.92	2.91	1.20
202050	Applied Thermodynamics	2.85	2.84	2.94	2.77	2.91	2.91	1.70
202051	Strength of Materials	2.26	2.21	2.33	2.30	1.86	1.70	1.50
202053	Machine Shop – I	2.89	2.90	2.90	2.90			2.85
203152	Electrical and Electronics Engineering	2.92	2.91	2.92	2.92	2.90	2.92	1.55
207002	Engineering Mathematics - III	2.48	2.43	2.50	2.46	1.67	1.75	1.60
Third Year(2020-21)	**Course**	CO1	CO2	CO3	CO4	CO5	CO6	**Target for Current Cycle**
302041	Design of Machine Element-I	2.90	2.80	2.75	2.89	2.81	2.91	1.90
302042	Heat Transfer	2.90	2.90	2.91	2.91	2.91	2.90	1.60
302043	Theory of Machines II	2.90	2.75	2.92	2.91	2.90	2.90	2.00
302044	Turbo Machines	2.62	2.65	2.92	2.92	2.77	2.77	1.35
302045	Metrology and Quality Control	2.92	2.91	2.91	2.93	2.94	2.91	1.65
302046	SKILL DEVELOPMENT	2.90	2.91	2.92	2.94	2.94	2.93	2.85
302047	Numerical Methods & Optimization	2.84	2.86	2.91	2.91	2.91	2.78	2.85
302048	Designe of Machine Elements II	2.78	2.91	2.91	2.83	2.87	2.89	2.20
302049	Refrigeration and Air conditioning	2.69	2.89	2.92	2.91	2.92	2.91	2.35
302050	Mechatronics	2.69	2.70	2.81	2.90	2.90	2.65	2.35
302051	Manufacturing Process-II	2.91	2.90	2.92	2.94	2.90	2.92	1.90
302052	MACHINE SHOP II	2.92	2.93	2.93	2.93			2.90
302053	Seminar	2.92	2.92	2.93	2.92	2.90	2.91	2.90
Final Year(2021-22)	**Course**	CO1	CO2	CO3	CO4	CO5	CO6	**Target for Current Cycle**
402041	Hydraulics and Pneumatics	2.71	2.72	2.92	2.92	2.89	2.91	2.90
402042	CAD/CAM and Automation	2.75	2.67	2.68	2.64	2.77	2.65	2.75
402043	Dynamics of Machinary	2.91	2.91	2.90	2.93	2.90	2.90	2.80
402046	Project - I	2.94	2.95	2.96	2.96	2.94	2.94	2.90
402047	Energy Engineering	2.75	2.75	2.30	2.07	2.07	1.98	2.90
402048	Mechanical System Design	2.63	2.68	2.35	1.71	1.76	1.83	2.90
402051	Project - II	2.92	2.92	2.96	2.98	2.96	2.98	2.90



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To improve the Course Outcome Attainment (COA) values, it is important to analyze the performance of students in each course. Based on this analysis, the courses can be categorized into three groups:

A. Courses with COA values below the target levels require faculty members to review the course content and teaching methodologies. This can help identify areas that need improvement. Additionally, faculty members can provide additional support and resources such as extra classes or online resources to help students better understand the course material.

B. Courses with COA values exceeding the target levels need faculty members to identify areas where students are performing well. They can incorporate more challenging assignments and projects to further enhance their skills and knowledge.

C. Courses with mixed COA values require faculty members to review the course content and teaching methodologies to identify areas for improvement. Additionally, faculty members can provide additional support and resources to students who are struggling to improve their COA values

Second Year Courses:

Although there has been some improvement in the Course Outcome Attainment (COA) values for the Manufacturing Processes I course compared to the previous academic year, the current COA values are still below the set target. This indicates that more efforts are needed to improve the COA values for this course. Similarly, for the Computer Aided Machine Drawing course, the COA values are higher but fall short of the required target.

On the other hand, for other courses, the COA values are higher than the set target. However, to further improve students' performance, it is recommended to implement additional measures such as incorporating more challenging assignments or projects, providing more opportunities for practice and feedback, or offering additional support and resources to students who may be struggling to meet the COA values.

Third Year Courses:

The Course Outcome Attainment (COA) values for all third-year courses in the program are above 2.6, which indicates that students are performing well in these courses.

Based on the Course Outcome Attainment (COA) values for all third-year courses in the program, it has been observed that the values are greater than 2.6. This is a positive indication of students' performance, as it signifies that they have been successful in achieving the expected learning

outcomes in these courses.

When COA values are higher than the set target, it suggests that the course content, teaching methodologies, and assessments are effective in facilitating student learning. This indicates that the faculty members have been successful in delivering the course material and ensuring that students have grasped the knowledge and skills needed to meet the learning outcomes.

It is important to note that although the COA values are high, there is always room for improvement. Therefore, faculty members can continue to monitor and evaluate the COA values to identify any areas for improvement and take necessary steps to enhance students' learning outcomes. By doing so, they can ensure that students are well-equipped to excel in their academic and professional pursuits.

Final Year Courses:

The Course Outcome Attainment (COA) values for courses such as Hydraulics and Pneumatics, CAD/CAM and Automation, Energy Engineering, and Mechanical System Design are higher than average, which is a positive sign of students' performance in these courses. However, despite the high COA values, these courses still fall short of the set targets. This indicates that further efforts are required to improve students' performance in these courses, to ensure that they achieve the expected learning outcomes.

To improve the COA values in these courses, faculty members can review the course content and teaching methodologies, assess the effectiveness of the assessments, and consider incorporating additional support and resources for students who are struggling to meet the targets. By doing so, students can be better equipped to meet the set targets in the next academic year.

On the other hand, courses such as Dynamics of Machinery, Project - I, and Project - II have COA values that are more than the set target values. This is a positive sign of students' performance, as they have achieved the expected learning outcomes in these courses. However, there is always room for improvement, and faculty members can continue to evaluate and improve the course content and teaching methodologies to further enhance students' learning outcomes.