



THAPAR INSTITUTE  
OF ENGINEERING & TECHNOLOGY  
(Deemed to be University)

## THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY

### DEPARTMENT OF ELECTRICAL AND INSTRUMENTATION ENGINEERING

- **Feedback from Graduating Students**
- **Feedback from Alumni**
- **Feedback from Employer**
- **Feedback from faculty**
- **Analysis of feedbacks received and action taken report**

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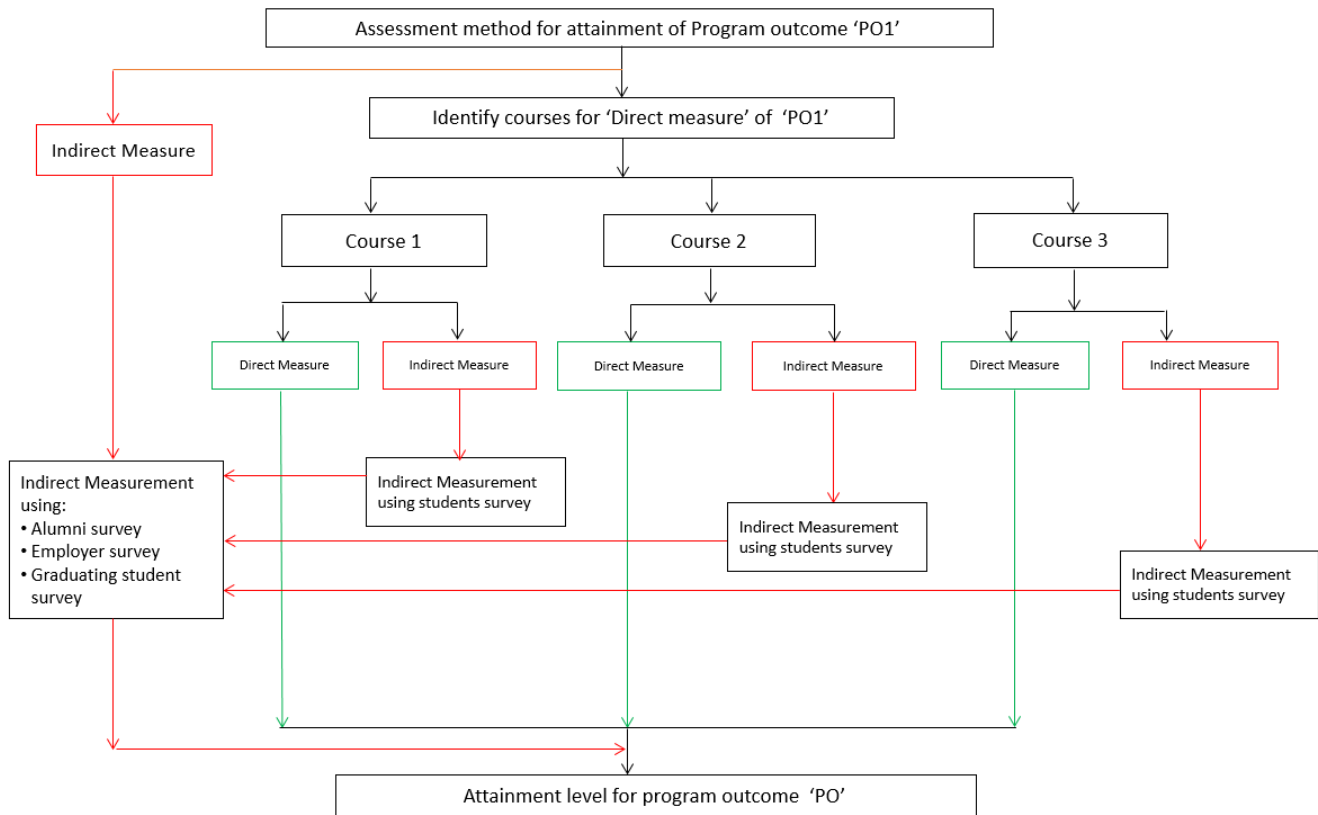
## **THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY**

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## Process of Program outcome attainment:

The Program Outcomes (PO) or the Program Specific Outcomes (PSO) are achieved through curriculum that offers a number of mandatory courses as well as elective courses. Each course in the curriculum has defined course outcomes that are mapped to the program outcomes and a set of performance criteria that are used to provide quantitative measurement of how well course outcomes are achieved. The process of PO or PSO attainment level is shown by the following flowchart:



**Figure 1 Flowchart showing the process of PO/PSO attainment level**

As shown in the flowchart given above, each of the PO or the PSO are assessed using a direct and an indirect method.

This assessment is carried out using the following measurable and quantitative parameters and survey/questionnaire techniques/tools.

### **A. Assessment Tools used for measurement of Program Outcome attainment:**

In the Outcome Based Education (OBE), the course outcome attainment scores measured using direct and indirect assessment tools is eventually used for measuring the attainment of Program Outcomes and Program specific outcomes. Thus, PO and PSO assessment process uses both direct and indirect measures to measure the attainment of each outcome. The examples of such measures are given below:

#### **1. Direct Assessment tools:**

After evaluating the attainment of course outcomes using direct assessment tools (as mentioned in Table 2. (a)), average direct CO score for each course is computed. Direct assessment score for attainment of PO and PSO is computed by mapping the direct CO scores for all courses with corresponding PO's as defined in the Program articulation matrix. Following direct assessment tools are employed for measuring PO /PSO attainment:

- Mid Semester Examinations [Once during 8<sup>th</sup> or 9<sup>th</sup> week of a semester]
- End semester Examination [once during 15<sup>th</sup> week of the semester]
- Tutorial Assignments [Varies depending on the tutorial engagement]
- Quizzes [Mostly once during semester, Varies and is decided by course coordinator]
- Projects [Mostly once during semester, Varies and is decided by course coordinator]

## 2. Indirect Assessment tools:

This includes feedbacks from all the stakeholders such as course exit survey, Graduating student survey, alumni feedback, Employer feedback etc.

<b>Table: Indirect Assessment Tools</b>		
<b>S. No.</b>	<b>Indirect Assessment Tool</b>	<b>Method Description</b>
1	Course Survey [Twice before MST and EST]	Course Survey is completed for every course in each semester to get a formal feedback from students for the courses offered in a semester and provide objective information to the faculty for self-appraisal, self-improvement & development. The course survey is focussed on attainment of course outcomes. Formal student feedback is obtained online and it is mandatory for all students to participate in such surveys. The course survey results are compiled by the individual course instructors for his feedback.
2	Graduating student's survey [Once per year for the graduating batch]	A questionnaire survey is used to measure the level of achievement of expected program outcomes/program specific outcomes. It is mandatory for all graduating students to participate in this questionnaire. Each participant is asked to rate his/her perception of achievement of the program outcomes/program specific outcome on a scale of 1 to 5 where 1 signifies a poor outcome and 5 signifies a high level of achievement of objectives. The indirect CO scores measured through this tool are mapped to Likert scale of 1 to 3. The assessment results are documented

		and discussed in the meeting of department faculty to make action points for initiating corrective and preventive actions. A sample filled copy of graduating students' survey form is provided in Annexure-I
3	Alumni survey [Once in three years]	It is believed that the perception of students changes from the time of graduation to some point in their respective careers as they get more mature and have learnt tricks of the trade on the job. At this point of time, they are in a better position to provide more valuable and objective feedback on the learning in their undergraduate program and also how much of the program outcomes (on some scale) have actually been possible. To obtain this information, a survey is conducted for practicing alumni who graduated during the last 2 to 5 years. This survey like the graduating student survey is targeted at the program outcomes & program specific outcomes achieved during the last 2 to 5 years. Again, the respondents are asked to rate each PO and PSO on a scale of 1 to 5. The indirect CO scores measured through this tool are mapped to Likert scale of 1 to 3. The findings of the survey are processed and used for effecting improvements in the program to achieve the program educational objectives and program outcomes.
4	Employer survey [Once in three years]	All the students of program to be accredited are required to spend a full six month's semester in the industry completing an industrial project under the joint supervision of industry supervisors and TIET faculty. All the faculty members are required to visit one or two organizations two times during their six month's semester in the industry for evaluation of students placed for their work term in these organizations. This provides an opportunity to take feedback of our graduated students working in these organizations. During the course of interaction with the employer of our students, the employers provide information on their performance against POs & PSOs through survey form. This form, like the other forms, has questions related to the POs & PSOs. The rating is again given on a scale of 1 to 5 with 5 representing the best performance. The indirect CO scores measured through this tool are mapped to Likert scale of 1 to 3. A sample copy of filled employer survey form is provided in Annexure-I

**B. Processes used for measurement of Program Outcome attainment:**

CO Attainment scores for each subject obtained by direct assessment tools is mapped to correlate PO or PSO using the course articulation matrix. Similarly, CO attainment scores achieved through indirect assessment tools are also mapped with the correlated PO or PSO.

$$\text{PO/PSO Attainment (Direct Assessment)} = \left[ \frac{\text{PO\_CO Mapping}}{3} \times \text{CO Attainment (Direct Assessment)} \right]$$

$$\text{PO/PSO Attainment (Indirect Assessment)} = \left[ \frac{\text{PO\_CO Mapping}}{3} \times \text{CO Attainment (Indirect Assessment)} \right]$$

Attainment for a program outcome is finally computed by taking weighted average of contributions of participating courses towards that particular PO or PSO.

Finally, program outcomes for entire course is assessed by taking weighted sum of direct and indirect assessment as

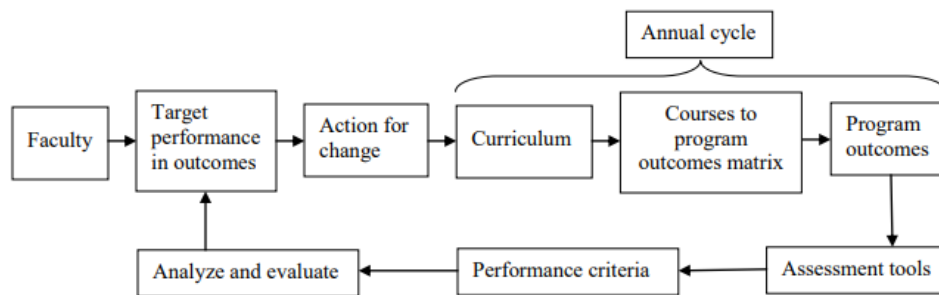
$$\text{Overall PO/PSO} = 80\% \text{ weightage of direct PO Score} + 20\% \text{ weightage of Indirect PO Score}$$

Table 1 below shows the frequency of data collection of each form.

**Table 1: Assessment tools, frequency of data collection and weightage**

Assessment Tool	When data is collected	Frequency of Data Analysis	Weightage
Course Portfolio	During the semester	Once in a year	80%
Course Survey	End of the semester	Once in a year	5%
Graduating Student's Survey	End of the program	Once in a year	5%
Alumni Survey	After 2-5 year of graduation	Once in a year	5%
Employer Survey		Once in a year	5%

On the basis of results of assessment tools, the assessment of level of attainment of each PO or PSO outcome is carried out. The assessment loop for each program outcomes is shown in Figure 2



**Figure 2 Assessment loop for PO/PSO**

**Actions taken based on the results of evaluation of each of the COs, POs & PSOs**

Based on the CO, PO, and PSO attainment levels, subjects were identified whose CO attainment level was low but weightage towards calculation of a PO/PSO level was high. For such subjects, the concerned faculty prepared an Action Taken Report (ATR), providing details of reasons for the low attainment level and the actions to improve upon the same (please see Table 2).

**Table 2: POs & PSOs Attainment Levels and Actions for improvement (2021-22)**

POs	Target level	Attainment level	Observations
<b>PO1:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
	<b>2.45</b>	<b>2.59</b>	Target achieved. Various art of learning methods will be included to develop the analytical skills for solving complex problems and individual attention is given to an individual student to solve the complex problems.
Though the target is achieved, in some courses, PO1 has not attained the target level, such as (2.00/3.00) and UEI607 (2.21/3.00) and for those action plan and action taken is proposed.			UEI501 (2.40/3.00), UEI610 (2.40/3.00), UTA025
<p><b>Action Plan UEI501</b></p> <ul style="list-style-type: none"> <li>The faculty of UEI501 is advised to connect the course with real-time examples.</li> <li>Faculty members are encouraged to take up online courses and faculty development programs for being updated on the recent technologies and shall act as mentors to guide the students in the online courses.</li> </ul> <p><b>Action Taken UEI501</b></p> <ul style="list-style-type: none"> <li>More tutorial questions have been added to the tutorials sheet.</li> <li>Some problems related to the Control system have been demonstrated in a MATLAB simulated environment.</li> </ul> <p><b>Action Plan UEI607</b></p> <ul style="list-style-type: none"> <li>The faculty of UEI601 is advised to connect the course with real-time examples.</li> <li>Faculty members are encouraged to take up online courses and faculty development programs for being updated on the recent technologies and shall act as mentors to guide the students in the online courses.</li> <li>A change in pedagogical initiatives is proposed which would be taken up when the courses related to this PO2 will be taught to the next batch (e.g. changing from teaching pedagogy with the assistance of PowerPoint presentation and providing other relevant matters in advance to students, etc.).</li> </ul> <p><b>Action Taken UEI607</b></p> <ul style="list-style-type: none"> <li>More tutorial questions have been added to the tutorials sheet.</li> <li>Some problems related to Digital signal Processing have been demonstrated in a MATLAB simulated environment.</li> <li>Students were advised to go through some online lectures.</li> <li>Live demonstrations of the experiments will be conducted in small groups for the betterment of their practical insights.</li> </ul> <p><b>Action Plan UEI610</b></p> <ul style="list-style-type: none"> <li>The faculty would consider revising the basic programming questions to give students a grasp of the programming instructions.</li> <li>More stress would be laid on the demonstration of the programs.</li> </ul> <p><b>Action Taken UEI610</b></p> <ul style="list-style-type: none"> <li>The stress was laid on the basic programming questions to apprise the students of the instructions and architecture of the processors.</li> </ul>			

**Action Plan UTA025**

The faculty members teaching the UTA025 course will be advised to:

- Give sharper inputs and feedback during the lab (tutorial sessions) for the development of the business idea
- Give greater developmental feedback to the students for writing the report.
- Summarize the salient points of the lecture session in the lab sessions too.

**Other Actions**

- The student counsellors of the program are advised to sort the problems of the non-performers conducting regular counselling sessions.
- Students will be motivated to enrol in NPTEL courses to equip themselves to strengthen their foundation through repeated learning.
- Analytical subjects will be demonstrated to students through video lectures.

POs	Target level	Attainment level	Observations
<b>PO2:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using the first principles of mathematics, natural sciences, and engineering sciences.			
	2.45	2.58	Target achieved. Design and analysis of various engineering problems in recent technology can be strengthened to improve students' ability.

Though the target is achieved, in some courses, PO2 has not attained the target level such as UEI607 (2.23/3.00), UEI501 (2.36/3.00) UEI608 (2.25/3.00), and UTA025 (2.00/3.00) and for those action plan and action taken is proposed.

**Actions**

- The action plan taken was already discussed for UEI607, UTA025, and UEI501 in PO1.

**Action plan UEI608:**

- A sufficient number of numerical problems related to biomedical signals and their measurements were planned to give to students to solve in class and then discuss. In view that the subject has no tutorial class, this activity is planned to do in either lecture class or lab class as per suitability.

**Action was taken UEI608:**

- A few sheets on numerical problems have been prepared to discuss, solve, and then submitted by the students to make the student comfortable dealing with the numerical problems related to biomedical signals and related measurements.
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POs	Target level	Attainment level	Observations
<b>PO3:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and the cultural, societal, and environmental considerations.			
	2.45	2.56	Target achieved. The scope for designing and developing components, systems, and similar activities including the constraints such as ethical, and safety needs lots of practice and obviously, is time-consuming.

Though the target is achieved, in some courses, PO3 was not attained the target level such as UEI501 (2.33/3.00), UEI610 (2.40/3.00) UTA025 (2.00/3.00), UEI605 (2.00/3.00) and UEI607 (2.33/3.00) and for those action plan and action taken is proposed.

**Action Plan UEI610**

- The students were affected by the epidemic. Some of the students were not able to get a good grasp of the subject as some of the classes were conducted online. Since the core companies did ask questions on embedded systems, the faculty were advised to consider issuing the kits to the students to enhance their hardware and programming skills.

**Action Taken UEI610**

- The students were issued the hardware kits even after the semester was over and their queries were cleared.

**Other Actions:**

- The action plan taken were already discussed in UEI501, UTA025, and UEI607 in PO1.
- It is also advised to conduct the lab experiments of UEI501 in smaller students group.
- The students will be motivated to include all the standard parameters and constraints according to National and International safety norms and to address environmental concerns.



<ul style="list-style-type: none"> <li>• General discussions on the latest technology will be suggested to the students which create additional interest among them.</li> <li>• The students were persuaded to consider interacting with their teachers outside the class.</li> <li>• Safety guidelines are available in every lab.</li> <li>• Safety protocols are maintained in each lab and following COVID-19 protocols.</li> </ul>			
POs	Target level	Attainment level	Observations
<b>PO4:</b> Use research-based knowledge and research methods including design of experiments, analysis, interpretation of data, and synthesis of the information to provide valid conclusions.			
	2.45	2.44	The target is nearly achieved. Students are encouraged to implement projects with Industry standards.
<p>Though the target is achieved, in some courses, PO4 has not attained the target level such as UEI501 (2.25 /3.00), UEI610 (2.00/3.00), UTA025 (2.00/3.00) and UEI607 (2.22/3.00)) and for those action plan and action taken is proposed.</p> <p><b>Action Plan UEI610</b></p> <ul style="list-style-type: none"> <li>• The faculty considered issuing the hardware kits to the students interested in hardware implementation.</li> <li>• The basic programming questions would be discussed giving students a particularized view of the processor architectures</li> </ul> <p><b>Action Taken UEI610</b></p> <ul style="list-style-type: none"> <li>• The students were issued kits and were motivated to improve their hardware and software skills.</li> <li>• Apart from the PIC and ARM kits, the students were issued Arduino and Raspberry hardware kits to improve their skills.</li> </ul> <p><b>Actions:</b> The action plan taken was already discussed for UEI501, UTA025, and UEI607 in PO1.</p>			
POs	Target level	Attainment level	Observations
<b>PO5:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.			
	2.45	2.44	The target is nearly achieved. Students are made to be familiar with recent technologies and are exposed open source tools.
<p>Though the target is achieved but in some courses, PO5 has not attained the target level such as UEI610 (2.33/3.00), UTA025 (2.00/3.00), and UEI607 (2.40/3.00) and for those action plan and action taken is proposed.</p> <p><b>Action Plan UEI610</b></p> <ul style="list-style-type: none"> <li>• The faculty would consider demonstrating in detail the tools used in assembling and compiling the programs.</li> <li>• The students would be asked to check all the salient features of the tools used in the Lab</li> </ul> <p><b>Action Taken UEI610</b></p> <ul style="list-style-type: none"> <li>• The students were given a demonstration of the different tools used in analyzing programs for different processors.</li> </ul> <p><b>Action Plan:</b></p> <ul style="list-style-type: none"> <li>• The action plan and taken were already discussed for UEI607 in PO1.</li> </ul> <p><b>Action Taken:</b></p> <ul style="list-style-type: none"> <li>• Apart from following the strategy used in PO2, the students were given an introductory session on different simulators for performing programming operations in their first class.</li> <li>• Demonstration of modern software tools and their applications in industries will be carried out.</li> <li>• Workshops will also be conducted on the usage of modern tools in industries.</li> <li>• Students are made to use open source tools like Google Classroom, Edmodo, etc. for student monitoring.</li> </ul>			
POs	Target level	Attainment level	Observations
<b>PO6:</b> Apply to reason informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.			
	2.45	2.60	Target achieved. Students are trained with various soft skills techniques by the trained faculty members to meet the Industry standard in multidisciplinary areas.
<p>Though the target is achieved but in some courses, PO6 has not attained the target level such as UEI610(2.00/3.00), UTA025(2.00/3.00) and for those action plans and actions taken proposed.</p>			

<b>Actions:</b>			
<ul style="list-style-type: none"> <li>The action plan and action taken are similar to that of the action plan and action was taken for UEI610, and UTA025 in PO3 and PO4</li> <li>Students' will be provided with the needful space around a semester to take up internships in the industry to understand the aspects of an engineer's work and its impact in multiple directions.</li> <li>Club activities, Awareness programs, and interactive sessions on green energy utilization are to be organized to create an impact.</li> <li>Courses like the Constitution of India which enables the students to gain knowledge in these domains are proposed.</li> </ul>			
<b>POs</b>	<b>Target level</b>	<b>Attainment level</b>	<b>Observations</b>
<b>PO7:</b> Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.			
	<b>2.45</b>	<b>2.75</b>	Target achieved.
Though the target is achieved but in UTA025 (2.00/3.00) PO7 was not attained the target level and for this action plan and action taken is proposed.			
<b>Actions:</b>			
<ul style="list-style-type: none"> <li>The action plan for UTA025 is discussed in PO1.</li> <li>Local visits will be arranged for visiting the society and industry to develop innovative ideas for sustainable development.</li> <li>Students will be given insights on adopting work ethics that contribute toward protecting the environment and leading to sustainability.</li> </ul>			
<b>POs</b>	<b>Target level</b>	<b>Attainment level</b>	<b>Observations</b>
<b>PO8:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			
	<b>2.45</b>	<b>2.75</b>	Target achieved
Though the target is achieved but in UTA025 (2.00/3.00) PO8 was not attained the target level and for this action plan and action taken is proposed.			
<b>Actions:</b>			
<ul style="list-style-type: none"> <li>Sessions on ethical awareness and academic integrity may be regularly organized to inculcate ethical responsibilities among the students</li> </ul>			
<b>POs</b>	<b>Target level</b>	<b>Attainment level</b>	<b>Observations</b>
<b>PO9:</b> Function effectively as an individual, and as a member or leader in diverse teams, and multidisciplinary settings.			
	<b>2.40</b>	<b>2.67</b>	Target achieved
Though the target is achieved but in UTA025 (2.00/3.00) PO9 was not attained the target level and for this action plan and action taken is proposed.			
<b>Actions:</b>			
<ul style="list-style-type: none"> <li>The action plan for UTA025 is discussed in PO1.</li> <li>Participation in Co-curricular and Extracurricular activities will be encouraged.</li> <li>Group activities like symposiums, Intra &amp; inter-department meet will be organized for effective team building.</li> </ul>			
<b>POs</b>	<b>Target level</b>	<b>Attainment level</b>	<b>Observations</b>
<b>PO10:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.			
	<b>2.40</b>	<b>2.67</b>	Target achieved. Effective communication methods are inevitable for students of Engineering and Technology. Emphasis on domain-specific aspects of communication and related training is given to students.
Though the target is achieved but in UTA025 (2.00/3.00) PO10 has not attained the target level and for this action plan and action taken is proposed.			
<b>Actions:</b>			
<ul style="list-style-type: none"> <li>The action plan for UTA025 is discussed in PO1.</li> <li>Professional training is given to students by various experts.</li> <li>Soft skill training programs will be provided for the improvement of communication and presentation skills.</li> <li>Seminars will be given for the students in classes to know the importance of communication and its related skills</li> </ul>			
<b>POs</b>	<b>Target level</b>	<b>Attainment level</b>	<b>Observations</b>
<b>PO11:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments.			
	<b>2.45</b>	<b>2.73</b>	Target achieved. Engineers can be superior managers and this is shown in Project-based learning, consultancy, and mini projects which contribute fully to the attainment of this PO. Students are trained to do projects like how it is performed in companies
Though the target is achieved but in UTA025 (2.00/3.00) PO11 was not attained the target level and for this action plan and action taken is proposed.			
<b>Actions:</b>			
<ul style="list-style-type: none"> <li>The action plan for UTA025 is discussed in PO1.</li> <li>Students are made to work on projects starting from the concept of evolution to prototype development.</li> <li>Students are encouraged to select electives from other domains.</li> </ul>			

<ul style="list-style-type: none"> <li>Students were made to contribute to Consultancy Project to enhance their expertise in project management and financial governance.</li> </ul>			
POs	Target level	Attainment level	Observations
<b>PO12:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.			
	<b>2.45</b>	<b>2.58</b>	Though Target achieved it is possible to induce the habit of life-long learning among the students.
Though the target is achieved UTA025 (2.00/3.00) and UEI610 (2.33/3.00) PO12 have not attained the target level and this action plan and action taken are proposed.			
<b>Action Plan UEI610</b>			
<ul style="list-style-type: none"> <li>To inculcate a lifelong learning process, the students would be encouraged to implement the “project-based learning” method.</li> <li>The case study that the students undertake to implement prompts them to review and search existing literature</li> </ul>			
<b>Action Taken UEI610</b>			
<ul style="list-style-type: none"> <li>The students would be informed at the beginning of the semester that the group of 4 students would submit a case study (explain the hardware and software part of the project)</li> <li>The students were informed of the counseling/ interaction time to interact with the teacher(s) outside the class.</li> </ul>			
<b>Actions:</b>			
<ul style="list-style-type: none"> <li>The action plan for UTA025 is discussed in PO1.</li> <li>The students will be motivated to take up online courses.</li> <li>The students will be encouraged to prepare papers for technical journals and take part in knowledge-enhancing domain-specific seminars, workshops, and conferences.</li> <li>Life-long learning is attained when an interest in the specialization is kindled in the student’s mind through several activities.</li> </ul>			
<b>PSOs Attainment Levels and Action taken for improvement (2020-21)</b>			
PSOs	Target level	Attainment level	Observations
<b>PSO1:</b> To apply knowledge of mathematics, sciences, and professional subjects to formulate, interpret and analyze problems appropriate to Electronics (Instrumentation and Control) Engineering.			
	<b>2.45</b>	<b>2.64</b>	Target achieved. Students insisted to learn the basics of computing and mathematics for their enhancement in analyzing the problems related to Electronics (Instrumentation and Control) Engineering. They are also motivated to do online courses in basics.
Though the target is achieved, in some courses, the PSO1 was not attained the target level such as UEI501 (2.40/3.00), UEI607 (2.30/3.00), and UEI610 (2.40/3.00) and for those action plan and action taken is proposed.			
<b>Action Plan UEI610</b>			
<ul style="list-style-type: none"> <li>The faculty would consider revising the basic programming questions to demonstrate the architecture of the processors.</li> <li>The students would be asked to implement all the instructions in the Lab.</li> </ul>			
<b>Action Taken UEI610</b>			
<ul style="list-style-type: none"> <li>The students were given basic programming questions to implement on a simulator.</li> <li>All the instructions were demonstrated in the class and lab.</li> </ul>			
<b>Actions:</b>			
<ul style="list-style-type: none"> <li>The action plan taken was already discussed for UEI501 and UEI607 in PO1.</li> <li>Students are encouraged to take online courses related to Instrumentation and Control.</li> <li>Tutorials based on engineering applications will be included.</li> <li>Industrial trips will be organized for the students to gain knowledge of practical applications of engineering fundamentals.</li> </ul>			
PSOs	Target level	Attainment level	Observations
<b>PSO2:</b> To employ appropriate engineering techniques, skills, tools, and research-based knowledge to realize Electronics (Instrumentation and Control) Engineering systems and engage in life- long learning.			
	<b>2.45</b>	<b>2.64</b>	Target achieved. Open electives are introduced to students so that they get knowledge in various domains
Though the target is achieved some PSO2 was not attained the target level such as UEI501 (2.25/3.00), UEI607 (2.00/3.00), UTA025 (2.00/3.00), and UEI610 (2.40/3.00) and for those action plan and action taken is proposed.			
<b>Action Plan UEI610</b>			
<ul style="list-style-type: none"> <li>The faculty would send a proposal to reduce the syllabus as it focuses on two processors.</li> </ul>			
<b>Action Taken UEI610</b>			
<ul style="list-style-type: none"> <li>Apart from taking the actions mentioned in PO3, PO4, and PO12, a proposal was sent to reduce the syllabus of UEI610.</li> </ul>			
<b>Actions:</b>			
<ul style="list-style-type: none"> <li>The action plan for UTA025 is discussed in PO1.</li> </ul>			

- The action plan taken was already discussed for UEI610 and UEI501 in PO1.
- The students will be encouraged to prepare papers for technical journals and take part in knowledge-enhancing domain-specific seminars, workshops, and conferences.
- Life-long learning is attained when an interest in the specialization is kindled in a student's mind through several activities
- Students are encouraged to select the electives from other domains and integrate their knowledge in the field of Electronics (Instrumentation and Control) Engineering systems.

Program Outcomes once mapped to the learning outcomes of a particular course gives us an insight of the level of achievement of students in that particular PO. Given this broadened picture of new understanding, we get an opportunity to improvise through initiatives and also implement certain changes that can lead us to have better performances. For example, in an outcome measurement related to ability to identify and formulate problems for engineering system was assessed through courses that basically require an understanding of engineering problems and its formulation which may lead to problem solving. Therefore in order to further strengthen student learning, we implemented a paradigm shift in teaching from **Teacher Centric to Student Centric Learning Approach**. This concept was introduced to the faculty through [Centre for Academic Practices and Student Learning \(CAPSL\)](#) training workshop which started in year 2016. All faculty from the department have been completed the basic course of New Direction Program and benefitted through this workshop. Faculty was trained to adopt academic practices such as outcome based learning, creative thinking, introducing assessment methods involving students, and many more. With these approaches, students were more open to creatively formulate problem.

On the other hand, where student is assessed for his/her ability to solve complex engineering problems, role of problem solving through tutorials becomes very important. While student centric approach did help in 2018-2019 but a marginal fall was visible in 2019-2020. One of the main reasons for this can be attributed to a shift to an **Online Mode of Teaching because of COVID pandemic**. Faculty was still in a learning mode to teach online and conduct tutorials. Lecture/Tutorial sessions needed to be channelized in less time. As a result, **Thapar Learning Management System (TIET-LMS)** was developed and effective July 2020, all academic activities are conducted through it, and reviewing tutorials has also now become seamless. It is anticipated that with the coming up of TIET-LMS, we foresee a positive improvement in this regard in the future.

We strongly believe that a static curriculum cannot bring in changes in the understanding and applying engineering design to produce solutions in the context of global, cultural, social, environmental and economic factors. Keeping this in view, our scheme and syllabi are updated from time to time. A Board of Studies (BOS) meeting is held on a regular basis wherein an expert opinion is sought from Industry and Academic experts in the field of civil engineering. Based on their suggestions, curriculum is modified and updated to match with the latest market trends. The scheme is then sent to the Senate for approval. One of the recent and major changes that we have incorporated in our Curriculum includes:

Three focus areas have been offered to B.E. Electronics (Instrumentation and Control) Engineering students admitted in 2019 onwards after the end of Second Year. The students shall be offered a certificate of Specialization done along with B.E. Electronics (Instrumentation and Control) Engineering Degree. These focused areas are:

- Industrial Automation
- Biomedical Instrumentation
- Smart Systems

The course syllabi, for these newly included courses, has been carefully designed giving due consideration to suggestions and rectifications proposed by the experts called from academia and industry both, during Board of Studies meetings held in the year 2020.

Over the past three years, particularly, we are laying **more stress on writing and presentation skills**. Casual, unprofessional writing is no more accepted in project report, capstone, or laboratory reports etc. This is keeping in view the need to communicate effectively with range of audiences through writing, with peers and with people in professional organizations. Now Students have to undertake several proof reading before the final report is accepted for evaluation purposes. Several templates of project writing have been prepared by the faculty and are circulated to students much before the submission time. Students are encouraged to read research papers and asked to bring in a small write up, which becomes useful in undertaking a Capstone Project (UEI 892). Students who go for project semester are exclusively judged for their writing and communications skills by their Industrial Mentor, which in itself is a motivation for students to work harder even when outside the campus. The **Centre for Training & Development (CTD) on campus** has been established to build upon the communication skills through lecture series, workshops and several other activities. We do see several benefits emanating from this Centre and we expect that a positive change will be reflected in the PO score over the next few years.

We have managed to continuously improve in our outcomes related to experimentation, analyzing and interpreting data for making informed engineering judgments. **Experiential Learning Centre (ELC)** activities have been introduced recently and at very early stage in the curriculum. Several activities have been accomplished successfully as ELC activities in the last 2 years such as:

- **Arduino Based Embedded System**
- **IoT Based Home Automation**
- **Smart Security System**
- **Robotic ARM Control**
- **Design and Implementation of Signal Conditioning and Data Acquisition System for a Process.**



Many more such Experiential activities are lined up for all I<sup>st</sup> –IV<sup>th</sup> Year BE Electronics (Instrumentation and Control) Engineering students to give them Hands-On-Training as well as experience of real life field problems and applications. Few glimpses of the experiential learning centre events held at EIED are shown in **Fig. 3**. These activities do not contribute to the total credits earned, rather are an initiative to inculcate team spirit and make students learn to design, fabricate and commission a real world problem while working in a team. This puts the students in a practice to do more similar projects (e.g. Capstone project, group design project, project semester) in their latter part of the curriculum.



**Fig. 3: Students involved in design and construction of Low Cost Housing Project**

**ANNEXURE-I**

**SAMPLE FILLED STUDENT SURVEY FORMS:**



Student Name and Roll No. Yashica Arora



THAPAR INSTITUTE  
OF ENGINEERING AND TECHNOLOGY  
(Dedicated to the Excellence)

**Industry Feedback Form**

Dear Sir,

Greetings from Thapar Institute of Engineering and Technology, Patiala

We wish to sincerely thank you for imparting training to our students engaged in project semester. In our quest to continually improve our engineering programs, we wish to seek your inputs regarding your perception of our students about the preparation they received at Thapar Institute of Engineering and Technology during the program of study. Based on your experience in working with our students who joined you in the six months training program, please provide an objective rating on the quality of our BE (Electrical) Engineering program on a scale of 1 to 5, with 1 indicating not well prepared, and 5 as well prepared. We propose to use this invaluable information for improving our program.

Grading		1	2	3	4	5
1	Do our students have an ability to apply knowledge of mathematics, science, and engineering?					*
2	Do our students have an ability to design and conduct experiments, as well as to analyze and interpret data?				*	
3	Do our students have an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability?				*	
4	Do our students have an ability to function in multidisciplinary teams?				*	
5	Do our students have an ability to identify, formulate, and solve engineering problems?					*
6	Do our students have an understanding of professional and ethical responsibility?				*	
7	Do our students have an ability to communicate effectively?					*
8	Do our students have an attitude to understand the impact of engineering solutions in a global, economic, environmental, and societal context?				*	
9	Do our students an ability to engage in life-long learning?					*
10	Do our students have a knowledge of contemporary issues?				*	
11	Do our students have an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice/entrepreneurship?					*

(1) What courses/topics would you like to see offered as UG course at TU or for continuing education to your staff.  
Basic Analytical Tools like Excel, Tableau,  
Power BI

(2) Overall how satisfied are you with BE (Electrical) Engineering program at TU. Tick whichever is applicable:  
**Excellent / Very good / Good / Average / Poor**

Your Name and Signature with date: BHARDWAJ, KUSHAGRA  
Digitally signed by BHARDWAJ, KUSHAGRA  
 DN: cn=BHARDWAJ, KUSHAGRA, ou=DGN  
 Date: 2023.08.08 12:08:10 +05:30

Your Organization Name: Mercer Mettl

Suggestion, if any: NA

Student Name and Roll No. PRANSH PAUL 101905071 ANNEXURE-X

DEPARTMENT OF ELECTRICAL AND INSTRUMENTATION ENGINEERING

PROJECT SEMESTER Session 2016-17

STUDENTS FEED BACK FORM

1. Name and Place of the Industry: BATA & COMPANY (CONSULTING)
2. Are you satisfied with the manner the department did your:
- |   |   |                                      |
|---|---|--------------------------------------|
| (i) Placement in various industrial units | <input checked="" type="checkbox"/> Satisfied | <input type="checkbox"/> Unsatisfied |
| (ii) Registration & Orientation           | <input checked="" type="checkbox"/> Satisfied | <input type="checkbox"/> Unsatisfied |
| (iii) Evaluation                          | <input checked="" type="checkbox"/> Satisfied | <input type="checkbox"/> Unsatisfied |

If not satisfied, please give your suggestions overleaf.

3. Was the technical assistance/guidance received from the Institute satisfactory? If not, identify the area as where assistance was lacking?  
IT WAS PERFECT, can include PYTHON for DATA ANALYSIS, as we already have SQL

4. Were you given a single project or number of similar projects?
- |                          |                                     |
|--------------------------|-------------------------------------|
| Single                   | No of Projects                      |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> |

5. Specify below areas of the project carried out by you  
DATA ANALYSIS Analysis & Design/Fabrication/ R&D/Supervision/.....

6. What additional subjects did you study in order to successfully complete the projects in the Industry?

PROJECT	SUBJECT
<u>PRICING B2C</u>	<u>PYTHON</u>

7. Problems faced in the Industry with regard to:
- |  | YES                      | No                                  |
|--|--------------------------|-------------------------------------|
| i) Project identification              | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| ii) Problem analysis                   | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| iii) Implementation of the Project     | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| iv) Acceptance in Industry             | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| v) Recognition of the work done by you | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

8. Has the Project Semester proved to be an exercise that has enhanced your
- |                                       | YES                                 | No                       |
|---------------------------------------|-------------------------------------|--------------------------|
| <b>I Personal Attributed at work:</b> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| i) Communications Skills              | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| ii) Confidence level                  | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| iii) Creativity                       | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| iv) Planning skills                   | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| v) Adaptability                       | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| vi) Being methodical                  | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| vii) Organizational skills            | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

- II Technical Aspects**
- |               |                                     |                          |
|---------------|-------------------------------------|--------------------------|
| Knowledge     | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Skill at work | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

9. Were you provided the following
- |                   |                                     |                                     |
|-------------------|-------------------------------------|-------------------------------------|
| i) Stipend        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| ii) Accommodation | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| iii) Conveyance   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

10. Any additional information/suggestion for further improvement of the project:  
(NONE)

A-Excellent

B-Good

C-Fair

Student Name and Roll No. Vaibhav Ajwale 101905102



**Industry Feedback Form**

Dear Ma'am,

Greetings from Thapar Institute of Engineering and Technology, Patiala

We wish to sincerely thank you for imparting training to our students engaged in project semester. In our quest to continually improve our engineering programs, we wish to seek your inputs regarding your perception of our students about the preparation they received at Thapar Institute of Engineering and Technology during the program of study. Based on your experience in working with our students who joined you in the six months training program, please provide an objective rating on the quality of our BE (Electronics Instrumentation & Control) Engineering program on a scale of 1 to 5, with 1 indicating not well prepared, and 5 as well prepared. We propose to use this invaluable information for improving our program.

Grading		1	2	3	4	5
1	Do our students have an ability to apply knowledge of mathematics, science, and engineering?				✓	
2	Do our students have an ability to design and conduct experiments, as well as to analyze and interpret data?				✓	
3	Do our students have an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability?				✓	
4	Do our students have an ability to function in multidisciplinary teams?					✓
5	Do our students have an ability to identify, formulate, and solve engineering problems?				✓	
6	Do our students have an understanding of professional and ethical responsibility?					✓
7	Do our students have an ability to communicate effectively?					✓
8	Do our students have an attitude to understand the impact of engineering solutions in a global, economic, environmental, and societal context?				✓	
9	Do our students an ability to engage in life-long learning?				✓	
10	Do our students have a knowledge of contemporary issues?				✓	
11	Do our students have an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice/entrepreneurship?				✓	

(1) What courses/topics would you like to see offered as UG course at TU or for continuing education to your staff.

Embedded System & Networking Concepts.

(2) Overall how satisfied are you with BE (Electronics Instrumentation & Control) Engineering program at TU. Tick whichever is applicable: Excellent / Very good / Good / Average / Poor

Your Name and Signature with date: RITIKA DHAL 24/8/22

Your Organization Name: INCEDO INC.

Suggestion, if any: \_\_\_\_\_

Student Name and Roll No Yashica Arora 101905018

ANNEXURE-X

DEPARTMENT OF ELECTRICAL AND INSTRUMENTATION ENGINEERING

PROJECT SEMESTER Session 2016-17

STUDENTS FEED BACK FORM

1. Name and Place of the Industry: Mercei Mettl, Gurgaon
2. Are you satisfied with the manner the department did your
- |   |                  |             |
|---|------------------|-------------|
| (i) Placement in various industrial units | <u>Satisfied</u> | Unsatisfied |
| (ii) Registration & Orientation           | <u>Satisfied</u> | Unsatisfied |
| (iii) Evaluation                          | <u>Satisfied</u> | Unsatisfied |

If not satisfied, please give your suggestions overleaf.

3. Was the technical assistance/guidance received from the Institute satisfactory? If not, identify the areas where assistance was lacking?

Satisfactory

4. Were you given a single project or number of similar projects?
- |        |                        |  |
|--------|------------------------|--|
| Single | <u>No. of Projects</u> |  |
|--------|------------------------|--|
5. Specify below areas of the project carried out by you Analysis & Design/Fabrication/ R&D/Supervision/.....
6. What additional subjects did you study in order to successfully complete the projects in the Industry?

PROJECT	SUBJECT
Corporate Operations	Excel, ZohoDesk/ CRM

7. Problems faced in the Industry with regard to:
- |  | Yes | No |
|--|-----|----|
| i) Project identification              |     |    |
| ii) Problem analysis                   |     |    |
| iii) Implementation of the Project     |     |    |
| iv) Acceptance in Industry             |     |    |
| v) Recognition of the work done by you |     |    |

8. Has the Project Semester proved to be an exercise that has enhanced your
- I Personal Attributed at work:**
- |                            | Yes | No |
|----------------------------|-----|----|
| i) Communications Skills   |     |    |
| ii) Confidence level       |     |    |
| iii) Creativity            |     |    |
| iv) Planning skills        |     |    |
| v) Adaptability            |     |    |
| vi) Being methodical       |     |    |
| vii) Organizational skills |     |    |

- II Technical Aspects**
- |               |  |  |
|---------------|--|--|
| Knowledge     |  |  |
| Skill at work |  |  |

9. Were you provided the following
- |                   |  |  |
|-------------------|--|--|
| i) Stipend        |  |  |
| ii) Accommodation |  |  |
| iii) Conveyance   |  |  |

10. Any additional information/suggestion for further improvement of the project:

A-Excellent

B-Good

C-Fair



### Survey form to assess the level of attainment of student outcomes – Employer

Dear Sir,

We express our sincere thanks for continually employing our graduate students over the years. We are sure our student are sufficiently equipped not only to take on the real world but also make a better place to live in through responsible and innovative use of technology.

We solicit your feedback on attainment of the student outcomes (the knowledge, skills and attitudes that students develop during the course of study at TU) of the BE Electrical Engineering program. Please answer the following questions on a scale of 1 to 5 where 1 indicates little achievement of skill, and 5 indicates great deal of achievement.

	Survey questionnaire	Level of attainment (answer on a scale of 1 to 5)		
		Your engineers need	TU preparati on	Overall
1	Do our students have an ability to apply knowledge of mathematics, science, and engineering?	5	5	5
2	Do our students have an ability to design and conduct experiments, as well as to analyze and interpret data?	5	4	4.5
3	Do our students have an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability?	5	4	4.5
4	Do our students have an ability to function on multidisciplinary teams?	5	3	4
5	Do our students have an ability to identify, formulate, and solve engineering problems?	5	5	5
6	Do our students have an understanding of professional and ethical responsibility?	5	4	4.5
7	Do our students have an ability to communicate effectively?	5	5	5
8	Do our students have the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context?	5	5	5
9	Do our students have recognition of the need for, and an ability to engage in life-long learning?	5	5	5
10	Do our students have knowledge of contemporary issues?	5	5	5
11	Do our students have an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice?	5	5	5

(1) What courses/topics would you like to see offered as UG course at TIET or for continuing education to your staff.

Advanced Excel, Basic Data Analytics

(2) Overall how satisfied are you with BE Electrical Engineering program at TIET and in your opinion how well is the specific program meeting its stated educational objectives. Cross-out whichever not applicable.

Excellent / Very good / Good / Average / Poor.

Your Name and Signature with date: \_\_\_\_\_

Your Organization Name: Mercer Mettl

BHARDWAJ

KUSHAGRA

Digitally signed by BHARDWAJ

KUSHAGRA

DN: cn=BHARDWAJ

KUSHAGRA, ou=GGN

Date: 2023.06.06 11:33:30

+03:30

Suggestion, if any: NA

## Survey form to assess the level of attainment of student outcomes – Employer

Dear Sir,

We express our sincere thanks for continually employing our graduate students over the years. We are sure our student are sufficiently equipped not only to take on the real world but also make a better place to live in through responsible and innovative use of technology.

We solicit your feedback on attainment of the student outcomes (the knowledge, skills and attitudes that students develop during the course of study at TU) of the BE Electronics Instrumentation & Control Engineering program. Please answer the following questions on a scale of 1 to 5 where 1 indicates little achievement of skill, and 5 indicates great deal of achievement.

	Survey questionnaire	Level of attainment (answer on a scale of 1 to 5)		
		Your engineers need	TU preparation	Overall
1	Do our students have an ability to apply knowledge of mathematics, science, and engineering?	4	4	4
2	Do our students have an ability to design and conduct experiments, as well as to analyze and interpret data?	4	4	5
3	Do our students have an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability?	4	4	4
4	Do our students have an ability to function on multidisciplinary teams?	5	5	5
5	Do our students have an ability to identify, formulate, and solve engineering problems?	4	4	4
6	Do our students have an understanding of professional and ethical responsibility?	5	5	5
7	Do our students have an ability to communicate effectively?	5	5	5
8	Do our students have the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context?	5	5	5
9	Do our students have recognition of the need for, and an ability to engage in life-long learning?	5	5	5
10	Do our students have knowledge of contemporary issues?	5	5	5
11	Do our students have an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice?	5	5	5

(1) What courses/topics would you like to see offered as UG course at TIET or for continuing education to your staff.

Embedded System & Networking Concepts.

(2) Overall how satisfied are you with BE Electronics Instrumentation & Control Engineering program at TIET and in your opinion how well is the specific program meeting its stated educational objectives. Cross-out whichever not applicable.

Excellent / Very good / Good / Average / Poor.

Your Name and Signature with date: RITIKA DALAL

Your Organization Name: JNCEDO PNC.

Ritika Dalal  
24/8/23

Suggestion, if any: \_\_\_\_\_

Name: Vaibhav Agawal  
R.No: 101905102



### Survey form to assess the level of attainment of student outcomes – Employer

Dear Sir,

We express our sincere thanks for continually employing our graduate students over the years. We are sure our student are sufficiently equipped not only to take on the real world but also make a better place to live in through responsible and innovative use of technology.

We solicit your feedback on attainment of the student outcomes (the knowledge, skills and attitudes that students develop during the course of study at TU) of the BE Electronics Instrumentation & Control Engineering program. Please answer the following questions on a scale of 1 to 5 where 1 indicates little achievement of skill, and 5 indicates great deal of achievement.

	Survey questionnaire	Level of attainment (answer on a scale of 1 to 5)		
		Your engineers need	TU preparation	Overall
1	Do our students have an ability to apply knowledge of mathematics, science, and engineering?	4	4	4
2	Do our students have an ability to design and conduct experiments, as well as to analyze and interpret data?	4	4	5
3	Do our students have an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability?	4	4	4
4	Do our students have an ability to function on multidisciplinary teams?	5	5	5
5	Do our students have an ability to identify, formulate, and solve engineering problems?	4	4	4
6	Do our students have an understanding of professional and ethical responsibility?	5	5	5
7	Do our students have an ability to communicate effectively?	5	5	5
8	Do our students have the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context?	5	5	5
9	Do our students have recognition of the need for, and an ability to engage in life-long learning?	5	5	5
10	Do our students have knowledge of contemporary issues?	5	5	5
11	Do our students have an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice?	5	5	5

(1) What courses/topics would you like to see offered as UG course at TIET or for continuing education to your staff.

Embedded System & Networking Concepts.

(2) Overall how satisfied are you with BE Electronics Instrumentation & Control Engineering program at TIET and in your opinion how well is the specific program meeting its stated educational objectives. Cross-out whichever not applicable.

Excellent / Very good / Good / Average / Poor.

Your Name and Signature with date: RITIKA DALAL

Your Organization Name: INCEDO PNC.

Suggestion, if any: \_\_\_\_\_

Name: Vaibhav Agarwal  
R.No: 101905102

Ritika Dalal  
24/05/23