



# ACHARYA INSTITUTE OF TECHNOLOGY

## OUTCOME BASED EDUCATION MANUAL



# ACHARYA INSTITUTE OF TECHNOLOGY

Affiliated to Visvesvaraya Technological University, Belagavi, Govt. of Karnataka.  
Approved by AICTE, New Delhi and Accredited by NBA and NAAC

## OUTCOME BASED EDUCATION MANUAL



Prepared By

**IQAC** | Internal Quality Assurance Cell  
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## PREFACE

This manual is a reference to help faculty members and Stakeholders to understand the Outcome Based Education (OBE) system implemented at Acharya Institute of Technology (AIT) since 2014. This manual provides a detailed description of Outcome Based Education implementation at all the four stages of educational process including Curriculum design, Teaching and Learning process, Assessment & Evaluation and Continuous quality improvement. Also it provides suitable guidelines for the faculty members to develop the course plan, assessment plan etc., in the process to measure the outcome of the students during their course of study and also after their graduation.

Outcome-Based Education (OBE) is an educational model that forms the base of a quality educational system. There is no single specified style of teaching or assessment in OBE. All educational activities carried out in OBE should help the students to achieve the set goals. The faculty may adapt the role of instructor, trainer, facilitator, and/or mentor based on the outcomes targeted. OBE enhances the traditional methods and focus on what the Institute provides to students. It show the success by making or demonstrating outcomes using statements "able to do" in favour of students. OBE provides clear standards for observable and measurable outcomes.

### **India, OBE and accreditations**

The induction of India in the Washington Accord in 2014 with the permanent signatory status of the National Board of Accreditation (NBA) is considered a big leap forward for the higher-education system in India. It means that an Engineering graduate from India can be employed in any one of the other countries who have signed the accord. For Indian Engineering Institutions to get accredited by NBA according to the pacts of the accord, it is compulsory that engineering institutions follow the Outcome Based Education (OBE) model.

The National Assessment and Accreditation Council (NAAC) and National Board of Accreditation (NBA) are the autonomous bodies for promoting global quality standards for technical education in India. NBA has started accrediting only the Programs running with OBE from 2013.

The National Board of Accreditation mandates establishing a culture of outcome based education in institutions that offer Engineering, Pharmacy and Management program. Reports of outcome analysis help to find gaps and carryout continuous improvements in the education system of an Institute, which is very essential.

## **Vision- Mission and Quality Policy**

### **Vision**

Acharya Institute of Technology, committed to the cause of sustainable value-based education in all disciplines, envisions itself as a global fountainhead of innovative human enterprise, with inspirational initiatives for Academic Excellence.

### **Mission**

Acharya Institute of Technology strives to provide excellent academic ambience to the students for achieving global standards of technical education, foster intellectual and personal development, meaningful research, ethical, and sustainable service to societal needs.

### **Quality Policy**

“We at Acharya Institute of Technology, promise to continually strive towards total quality in all our endeavours through Equity with Accessibility, Commitment with Honesty, Adaptability with Efficiency while blending Concern for Environment and Social Development”.

### **Motto**

“Nurturing Aspirations, Supporting Growth”

### **Core Values**

- Pursuit of Excellence
- Integrity and Transparency
- Leadership
- Teamwork

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### Abbreviations:

<b>OBE</b>	Outcome Based Education	<b>BTL</b>	Bloom’s Taxonomy Level
<b>LOT</b>	Lower Order of Thinking	<b>HOT</b>	Higher Order of Thinking
<b>PEO</b>	Program Educational Objectives	<b>PO</b>	Program Outcome
<b>CO</b>	Course Outcome	<b>PSO</b>	Program Specific Outcome
<b>UE</b>	University Theory Exam	<b>POE</b>	Practical Oral Exam
<b>CE</b>	Course Exit Survey	<b>HoD</b>	Head of Department
<b>PC</b>	Program Coordinator	<b>DAB</b>	Department Advisory Board
<b>PAC</b>	Program Assessment Committee	<b>A.Y.</b>	Academic Year

## 1. PRIMARY DEFINITIONS AND NOMENCLATURE

**Vision:** A vision statement is a document that states the current and future objectives of a Department. The vision statement is intended as a guide to help the department make decisions that align with its philosophy and declared set of goals.

**Mission:** The mission statement should define the broad purposes the program /department is aiming to achieve, describe the community the program /department is designed to serve, and state the values and guiding principles which define its standards.

**Program educational objectives (PEOs):** PEOs are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. Knowledge, Skill and Attitude are the three behavioral elements based on which PEOs are constructed.

**Program Outcomes (POs):** Program outcomes are statements that describe what students are expected to know and be able to do upon graduating from the program. These relate to the skills, knowledge, analytical ability, attitude and behavior that students acquire through the program.

**Program Specific Outcomes (PSOs):** Program Specific Outcomes are statements that describe what the graduates of a specific engineering program should be able to do.

**Course Outcomes (COs):** It is a detailed description of what a student must be able to do at the conclusion of a course.

**Course Information Sheet (CIS):** This sheet summarizes the information of a particular course and it gives the overall view of how the COs and POs are mapped in each unit.

**Continuous Internal Evaluation (CIE):** Continuous Internal assessment is a form of educational examination that evaluates a student's progress throughout a prescribed course.

**Semester End Examinations (SEE):** SEE means the examinations to be held at the end of each semester separately for theory & practical part on such dates as the University/College may determine.

**Attainment** is the action or fact of achieving a standard result towards the accomplishment of desired goals. Primarily attainment is the standard of academic attainment as observed by test or examination result.

## 2. OUTCOME BASED EDUCATION (OBE):

Outcome-Based Education (OBE) is an educational model that forms the base of a quality educational system. There is no single specified style of teaching or assessment in OBE. All educational activities carried out in OBE should help the students to achieve the set goals. The faculty may adapt the role of instructor, trainer, facilitator, and/or mentor based on the outcomes targeted. OBE enhances the traditional methods and focus on what the Institute provides to students. It shows the success by making or demonstrating outcomes using statements "able to do" in favor of students. OBE provides clear standards for observable and measurable outcomes.

Outcome based education (OBE) is a student-centred instruction model that focuses on measuring student performance through outcomes. Outcomes include knowledge, skills and attitudes. Its focus remains on evaluation of outcomes of the program by stating the knowledge, skill and behavior a graduate is expected to attain upon completion of a program and after 4 years of graduation. In the OBE model, the required knowledge and skill sets for a particular engineering degree is predetermined and the students are evaluated for all the required parameters (Outcomes) during the course of the program.

### Benefits of OBE

- **Clarity:** The focus on outcome/ creates a clear expectation of what needs to be accomplished by the end of the course.
- **Flexibility:** With a clear sense of what needs to be accomplished, instructors will be able to structure their lessons around the student's needs.
- **Comparison:** OBE can be compared across the individual, class, batch, Program and Institute levels.
- **Involvement:** Students are expected to do their own learning. Increased student involvement allows students to feel responsible for their own learning, and they should learn more through this individual learning.

### Features of OBE

- OBE is an educational process that focuses on what students can do or the qualities they should develop after they are taught.
- OBE involves the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of higher order learning and mastery rather than accumulation of course credits.
- Both structures and curricula are designed to achieve those capabilities or qualities.

- Discourages traditional education approaches based on direct instruction of facts and standard methods.
- It requires that the students demonstrate that they have learnt the required skills and content.

#### **Deficiencies in Traditional education**

- Provides students with a learning environment with little attention to whether or not students ever learn the material.
- Students are given grades and rankings compared to each other – students become exam oriented or CGPA driven.
- Graduates are not completely prepared for the workforce.
- Lack of emphasis on soft skills needed in jobs e.g. communication skills, interpersonal skills, analytical skills, working attitude etc.

#### **Expectations of students under OBE – the outcome**

- Students are expected to be able to do more challenging tasks other than memorize and reproduce what was taught.
- Students should be able to: write project proposals, complete projects, analyze case studies, give case presentations, show their abilities to think, question, research, and make decisions based on the findings.
- Be more creative, able to analyze and synthesize information.
- Able to plan and organize tasks, able to work in a team as a community or in entrepreneurial service teams to propose solutions to problems and market their solutions.
- Students should be enriched on three dimensional scales of knowledge, skill and attitude throughout the course.

### **3. PROCESS OF DEFINING VISION AND MISSION OF THE DEPARTMENT**

The following steps are followed to establish Vision and Mission of Department.

**Step 1:** The Vision & Mission of the Institute is taken as the basis.

**Step 2:** The Department conducts brain-storming sessions with the faculty and Department Academic Committee (DAC) on the skill-set required by the local and global employers, Industry Advances in Technology and R & D, and the draft copy of the Vision and Mission of the Department is drafted.

**Step 3:** The department circulates these statements among the stakeholders of the programme such as Industry, Faculty, Alumni, Parents & Employer and collects the views to refine the draft Vision and Mission statements.

**Step4:** Department Academic Committee (DAC) based on stakeholder's feedback revises the draft version based on their inputs.

**Step 5:** These draft statements are forwarded to the Department Advisory Board (DAB) to look into the relevance and consistency with the Vision and Mission of the institute.

**Step 6:** The accepted views are analysed and reviewed by IQAC to check the consistency with the vision and mission of the institute.

#### **4. PROCESS OF DEFINING PSOs AND PEOs OF THE DEPARTMENT**

- The Program curriculum is adopted as per university regulation since we affiliated to VTU, Belagavi
- Inputs are obtained from alumni and other stake holders. Also the inputs are considered from reports like WEF's Future of Jobs, India skills, FICCI and Deloitte.
- Besides, a skill in demand analysis is carried out periodically at the Academic council, Programme Assessment Committee and Department Advisory committee to identify the core areas in the Program domain that are consistent with industry needs.
- The Centre of Excellence in the department is established based on core areas in the program.
- PSOs are defined based on the Centre of Excellence of the Department. A list of 2 to 4 Program Specific Outcomes (PSOs) that the graduates of the program will attain will be listed here.
- The PEOs are established to reflect the career and professional accomplishments of the graduates based on the three behavioral elements of Knowledge, Skill and Attitude.

#### **5. THE PROGRAM OUTCOMES (POS) DEFINED BY NATIONAL BOARD OF ACCREDITATION (NBA)**

The POs essentially indicate what the students can do from subject-wise knowledge acquired by them during the program. As such, POs define the professional profile of an engineering graduate. NBA has defined the following twelve POs for an engineering graduate. These are in line with the Graduate Attributes as defined by the Washington Accord.

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. **Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions for complex problems.
5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a

member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

## **6. PUBLICATION AND DISSEMINATION:**

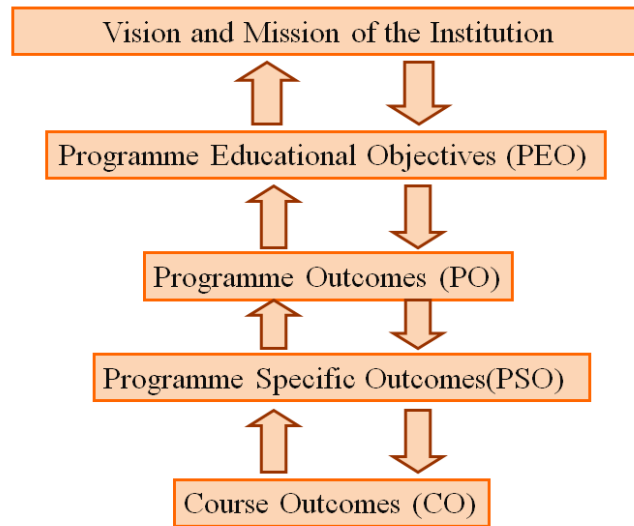
The Vision, Mission statement of the Department and Institution, CO statements, PSO statements, PO and PEO statements are reached to all the students and stake holders of the department. The process of publication and dissemination is described below.

- College Website
- Principal Room
- Department
- HOD Chamber
- Laboratories
- Department Library
- Classrooms
- Lab Manuals
- Course files
- News Letter
- Department Magazines

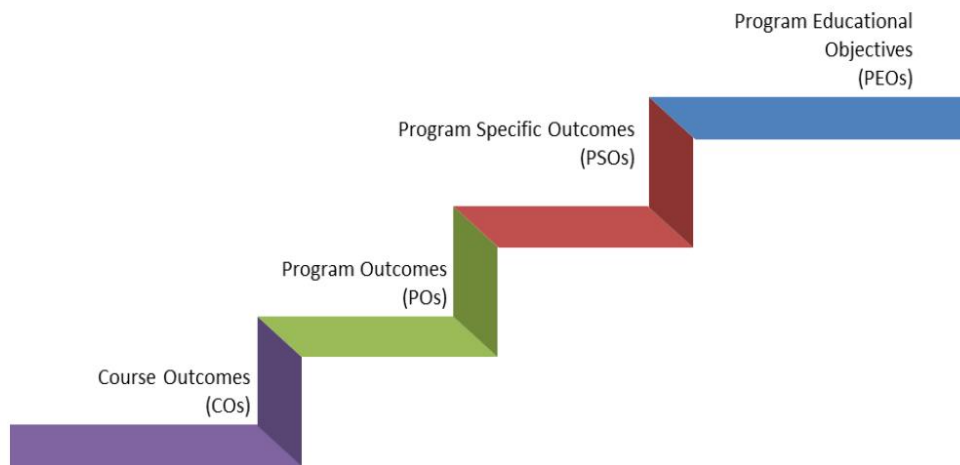
## **7. OBE FRAMEWORK**

The OBE model measures the progress of the graduate in four parameters, which are

- Program Educational Objectives (PEO)
- Program Specific Outcomes (PSO)
- Program Outcomes (PO)
- Course Outcomes (CO)



**Figure 1. Parameters of Outcome Based Education (OBE)**



**Figure 2: Process for the evaluation of Programme Outcomes POs, PSOs and PEOs**

## OBE Framework for an Institute



## 8. COURSE OUTCOME STATEMENTS

Course Outcomes (COs): Statements indicate, what a student can do after the successful completion of a course. Every Course leads to some Course Outcomes. The CO statements are defined by considering the course content covered in each module of a course. For every course, Course outcomes are written module wise and there may be 5 or 7 COs. The keywords used to define COs are based on Bloom's Taxonomy.

**Well-written course outcomes involve the following parts:**

1. Action verb
2. Subject content
3. Level of achievement as per BTL
4. Modes of performing task (if applicable)

**Illustration:**

Students are able to

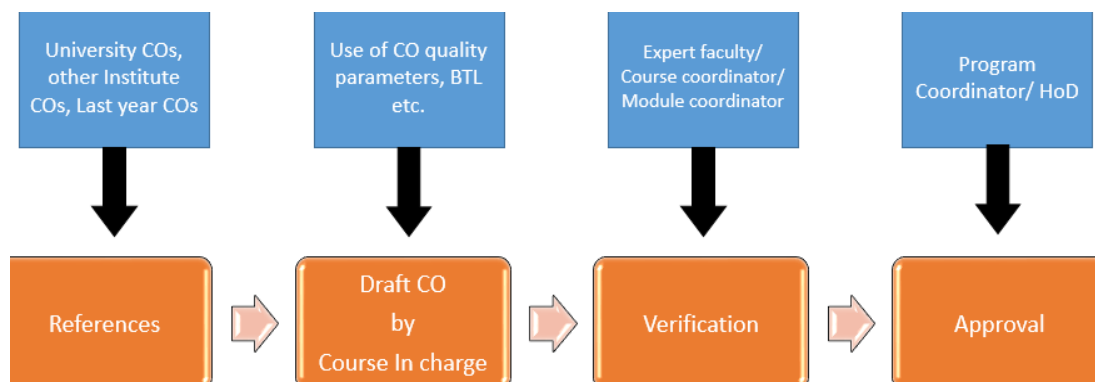
- 1) Design column splices and bases → action verb (underline)
- 2) Determine the losses in a flow system → Subject content
- 3) Use structural analysis software to a competent level. → level of achievement
- 4) Present seminar on real life problems → Modes of performing task with action verb

***While writing COs the following questions/points must be addressed properly.***

<b>Specific</b>	Is there a description of precise behavior and the situation it will be performed in? Is it concrete, detailed, focused and defined?
<b>Measurable</b>	Can the performance of the outcome be observed and measured?
<b>Achievable</b>	With a reasonable amount of efforts and application can the outcome be achieved? Are you attempting too much?
<b>Relevant</b>	Is the outcome important or worthwhile to the learner or stakeholder? Is it possible to achieve this outcome?
<b>Time-Bound</b>	Is there a time limit, rate number, percentage or frequency clearly stated? When will this outcome be accomplished?

## Quality of Course Outcome

Process at department level to maintain quality of CO



## BLOOM'S TAXONOMY

Bloom's Taxonomy was created in 1956 under the leadership of educational psychologist Dr. Benjamin Bloom in order to promote higher forms of thinking in education, such as analysing and evaluating concepts, processes, procedures, and principles, rather than just remembering facts. It is most often used when designing educational, training, and learning processes. Bloom's Taxonomy should be applied when creating objectives. At the end of the learning process, the goal of Bloom's taxonomy is that a student has sharpened a new skill, level of knowledge, and/or developed a different attitude towards the subject.

Bloom's Taxonomy comprises of three learning domains: cognitive, affective, and psychomotor. Designers, trainers, and educators often refer to them as KSA (Knowledge [cognitive], Skills [psychomotor], and Attitudes [affective]). After a learning experience, the learner should possess a new skill, knowledge, and/or attitude. The Figure presented here depicts the hierarchy of skills in the cognitive domain.

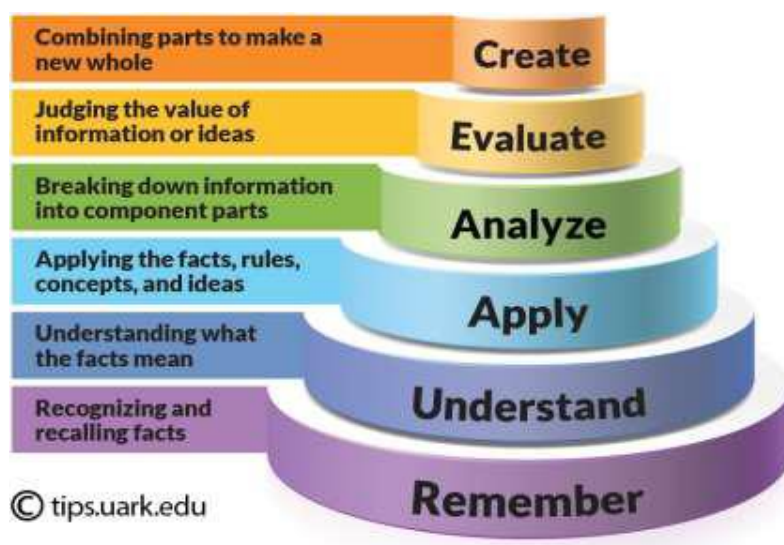


Figure 3: BLOOM'S TAXONOMY

<b>Blooms Taxonomy</b>		
<b>Domains</b>	<b>Keywords</b>	<b>Example</b>
<b>Remembering:</b> Recall or retrieve previous learned information.	Defines, describes, identifies, knows, labels, lists, matches, names, outlines, recalls, recognizes, reproduces selects, states	Recite a policy. Quote prices from memory to a customer. Recite the safety rules.
<b>Understanding:</b> Comprehending the meaning, translation, interpolation, and interpretation of instructions and problems. State a problem in one's own words.	Comprehends, converts, defends, estimates, explains, extends, generalizes, gives an example, infers, interprets, distinguishes, paraphrases, predicts, rewrites, summarizes, translates	Rewrite the Principles of test writing. Explain in one's own words the steps for performing a complex task. Translate an equation into a computer spreadsheet.
<b>Applying:</b> Use a concept in a new situation or unprompted use of an abstraction. Applies what was learned in the classroom into novel situations in the workplace.	Applies, changes, computes, constructs, demonstrates, shows, discovers, modifies, manipulate, operates, predicts, produces, prepares, relates, solves, uses	Use a manual to calculate an employee's vacation time. Apply laws of statistics to evaluate the reliability of a written test.
<b>Analyzing:</b> Separates material or concepts into component parts so that its organizational structure may be understood. Distinguishes between facts and inferences.	Analyzes, breaks down, relates, compares, contrasts, diagrams, differentiates, identifies, illustrates, discriminates, distinguishes, infers, outlines, selects, separates deconstructs,	Troubleshoot a piece of equipment by using logical deduction. Recognize logical fallacies in reasoning. Gathers information from a department and selects the required tasks for training.
<b>Evaluating:</b> Make judgments about the value of ideas or materials.	Appraises, compares, concludes, contrasts, criticizes, critiques, defends, describes, evaluates, explains, interprets, justifies, discriminates, summarizes, supports, relates,	Select the most Effective solution. Hire the most qualified candidate. Explain and justify a new budget
<b>Creating:</b> Builds a structure or pattern from diverse elements. Put	Categorizes, combines, compiles, composes, creates, devises, designs, explains,	Write a company Operations or process manual. Design a machine

parts together to form a whole, with emphasis on creating a new meaning or structure.	generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes	to perform a specific task. Integrates training from several sources to solve a problem. Revises and process to improve the outcome
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The cognitive process dimensions- categories					
Lower Order of Thinking (LOT)			Higher Order of Thinking (HOT)		
Knowledge	Understand	Apply	Analyse	Evaluate	Create
Recognizing (identifying)	Interpreting	Executing	Differentiating	Checking (coordinating, detecting, testing, monitoring)	Planning
Recalling (retrieving)	Illustrating	Implementing	Organizing	Critiquing (judging)	Generating
	Classifying		Attributing		Producing (construct)
	Summarizing				
	Inferring (concluding)				
	Comparing				
	Explaining				



The Knowledge Dimension			
Concrete Knowledge		Abstract knowledge	
Factual	Conceptual	Procedural	Metacognitive
<ul style="list-style-type: none"> <li>• Knowledge of terminologies</li> <li>• Knowledge of specific details &amp; elements</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge of classifications and categories</li> <li>• Knowledge of principles &amp; generalizations</li> <li>• Knowledge of theories, models &amp; structures</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge of subject specific skills and algorithms</li> <li>• Knowledge of subject specific techniques and methods</li> <li>• Knowledge of criteria for determining when to use appropriate procedures</li> </ul>	<ul style="list-style-type: none"> <li>• Strategic Knowledge</li> <li>• Knowledge about cognitive task, including appropriate contextual and conditional Knowledge</li> <li>• Self- Knowledge</li> </ul>

## 9. CO-PO Mapping Guidelines

All the courses in the curriculum must cover all the POs (and PSOs). For a course, we map the COs to POs through the CO-PO matrix and to PSOs through the CO-PSO matrix in Course Information sheet (CIS).

### PROCESS INVOLVED IN CO-PO MAPPING

The role of CO-PO mapping will be assigned to the Course instructor (faculty) involved in the teaching-learning process of that particular course. After the course (subject) allotment by the department, the Module co-ordinator of the course has to write appropriate COs for their corresponding course discussing with course handling faculty members. It should be narrower and measurable statements. By using the action verbs of learning levels (Bloom's Taxonomy), CO's will be designed and written. CO statements should describe what the students are expected to know and able to do at the end of each course, which are related to the skills, knowledge and behavior that students will acquire through the course.

After writing the CO statements, CO will be mapped with PO of the department. The Course Outcome attainment coordinator has to consolidate the CO's of the respective year and maintain the documentation of the CO attainment level of the respective year courses as well as documentation of the individual students extra-curricular and co-curricular activities for PO attainment evaluation.

1. **Map COs to POs:** Each CO is mapped to relevant POs (direct or indirect contribution).
2. **Use a Correlation Level Scale:**

Level	Meaning
1	Low correlation
2	Medium correlation
3	High correlation
-	No correlation

### Rubrics for CO-PO Correlation Level

- A CO shouldn't map to all POs. Typically, 50% and above POs to be mapped per CO.
- **Provide evidence:** Each mapped PO should be supported by specific assessments.
- Use **Level 3** if the CO directly targets the knowledge or skills mentioned in the PO. CO **strongly contributes** to achieving the PO.

- Use **Level 2** if the CO supports or enhances the PO indirectly or partially. (CO **moderately contributes** to the PO).
- Use **Level 1** if the CO marginally targets to knowledge or skills in the PO. CO has and **minimal contribution** to the PO.
- Use **0** or leave blank if there's no alignment between the CO and the PO.

Correlation Level	Score	Description
<b>High</b>	3	CO <b>strongly contributes</b> to achieving the PO. <ul style="list-style-type: none"> <li>• Assessed directly via major assessments (e.g., exam questions, projects).</li> <li>• If the CO directly targets the knowledge or skills mentioned in the PO.</li> </ul>
<b>Moderate</b>	2	CO <b>moderately contributes</b> to the PO. <ul style="list-style-type: none"> <li>• Assessed through some activities or assignments.</li> <li>• If the CO supports or enhances the PO indirectly or partially.</li> </ul>
<b>Low</b>	1	CO has a <b>minimal contribution</b> to the PO. <ul style="list-style-type: none"> <li>• Evidence is weak or partial.</li> <li>• If the CO contributes marginally.</li> </ul>
<b>No Correlation</b>	-	CO <b>does not contribute</b> to the PO. No direct or indirect relationship.

**Example (CO-PO Justification Based on Rubric):**

CO Statement	Mapped PO	Correlation	Justification
Apply Newton's laws to solve engineering problems	PO1 (Engineering Knowledge)	3	Strong conceptual application tested via problem-solving in tests
Prepare lab reports and communicate results	PO10 (Communication)	2	Report writing and presentations partially assessed
Use Excel for basic data analysis	PO5 (Modern Tool Usage)	1	Limited use in one assignment only

## CO Target Setting Process:

The target (or set) attainment level should be fixed by the Course coordinator based on the previous year results and quality of current batch of students. Target setting is used to define a measurable benchmark for student achievement of each CO.

### Steps to Set CO Targets:

#### 1. Define Assessment Tools:

- Internal exams (IA-1, IA-2, etc.)
- Assignments, labs, projects
- End Semester Exam (SEE)

#### 2. Weightage for CIE and SEE

- CIE=60% SEE=30% CES =10%

#### 3. Threshold for CIE and SEE:

- Threshold for CIE  $\geq 70\% = L3$  ,  $\geq 60\% = L2$   $\geq 40\% = L1$
- Threshold for SEE  $\geq 60\% = L3$  ,  $\geq 50\% = L2$   $\geq 35\% = L1$

#### 4. Select target Marks and Target attainment on:

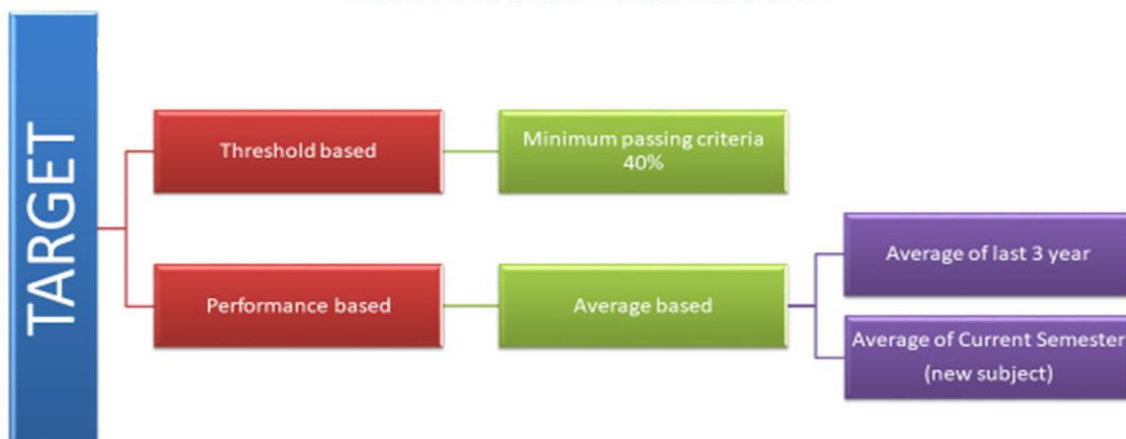
- Past Student performance
- Course Difficulty level
- Bloom's Taxonomy level of the CO

### Rubric for setting target marks and target attainment for CIE:

Target scores are set for each CO as per the following procedure:

- a. If the average CO attainment over the past three years, ie,  $((CAYm1+CAYm2+CAYm3)/3) \geq 1.8$ , the target marks shall be increased by 5% (ie., 65% if the already set value is 60%) otherwise keep the target marks same as that in the previous year. Once the target marks is increased by 5%, that value is maintained for 2 academic years.
- b. If any of the CO fails to attain the required level ( $\geq 1.8$ ), the target marks is sustained and this procedure is repeated in the subsequent year.
- c. For practical courses set the minimum target marks as 70% and an increment of "5%" (ie., 75% if the already set value is 70%), can be given if the required target level is met (If avg. CO attainment  $\geq 2.1$ ).

## SETTING TARGETS FOR ATTAINMENT



Level is the set percentage of students scoring the set target score in percentage.  
3 levels of attainment are defined as 1-Low; 2-medium; 3- High

Example: If the set target marks is 60%

- Level 3 indicates 70% of students score  $\geq 60\%$  of marks of the particular CO.
- Level 2 indicates 60% of students score  $\geq 60\%$  of marks of the particular CO.
- Level 1 indicates 40% of students scoring  $\geq 60\%$  of mark of the particular CO.

Target Attainment	Target marks	CO Target Description	Typical Criteria
$\geq 70\%$	$\geq 60\%$	70% of students attain $\geq 60\%$ marks	<ul style="list-style-type: none"> <li>• Used for foundational or well-supported topics with high student engagement.</li> <li>• CO with L1 and L2 RBTL</li> </ul>
$\geq 60\%$	$\geq 60\%$	60% of students attain $\geq 60\%$ marks	<ul style="list-style-type: none"> <li>• Used for moderately challenging topics.</li> <li>• CO with L3 RBTL</li> </ul>
$\geq 40\%$	$\geq 60\%$	40% of students attain $\geq 60\%$ marks	<ul style="list-style-type: none"> <li>• Used for complex or abstract topics, or newly introduced concepts.</li> <li>• CO with L4 and above RBTL</li> </ul>

### • Rubric for Attainment in SEE

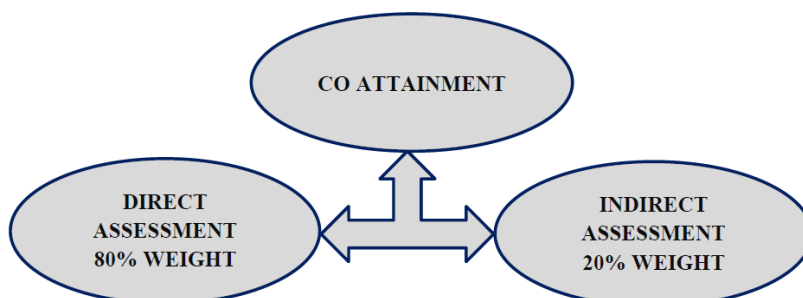
Target Attainment	Target marks	CO Target Description	Typical Criteria
$\geq 50\%$	$\geq 50\%$	$\geq 50\%$ of students attain $\geq 50\%$ marks	<ul style="list-style-type: none"> <li>• Common for all COs i.e Equal Weightage to all COs</li> </ul>

## 10. CO ATTAINMENT ASSESSMENT

AIT has its own well defined course outcomes based on the syllabus of each course provided by the University. Both direct and indirect method of assessment is followed for Course Outcome (CO) attainment assessment. The weightage for direct attainment is 80% while that for indirect attainment is 20%. The various assessment tools for direct attainment assessments are Internal Tests, Mid -Semester and End Semester Examination and Assignments. The indirect tool used is Course End Survey. A standard excel template has been implemented in the institute to assess periodically the attainment of course outcomes and also program outcomes by the courses.

The standardised template has the following information.

- The course outcome statements have defined for each course by the team comprising of DAC members, domain experts and faculty members through meetings.
- The threshold values and target percentage for Continuous Internal Evaluation (CIE) and for Semester End Examination (SEE) were set through the department academic committee and course coordinators based on the previous university results of students.
- The weight percentages are defined for components like CIE, SEE and CES which contributes to final attainment of the course outcomes.
- All course outcomes are mapped to PO's and PSO's in the scale of 1 to 3 by the help of DAC members, domain experts and faculty members.
- The final course outcomes, program outcomes and program specific outcomes attainments are computed by using standardised excel template considering the weight percentages accounting CIE, SEE and CES.



## **Attainment of COs**

- Attainment of COs can be measured directly and indirectly.
- Direct attainment of COs can be determined from the performances of students in all the relevant assessment instruments.
- Indirect attainment of COs can be determined from the course end survey.
- The course end survey form should permit receiving feedback from students on all the COs.

### **Direct CO attainment**

- Direct attainment of COs is determined from the performances of students in Continuous Internal Evaluation (CIE) and Semester End Examination (SEE).
- The proportional weightages of CIE: SEE: CES will be as per the academic regulations in force. Proportions of 60:30:10 are all possible!
- Direct attainment of a specific COs is determined from the performances of students to all the assessment items related to that particular CO.
- Hence, every assessment item needs to be tagged with the relevant CO.

### **Direct CO attainment from CIE**

- Continuous Internal Evaluation (CIE) is conducted and evaluated by the Department itself. Thus, institutions have access to question-wise marks in all assessment instruments in CIE.
- When questions are tagged with relevant COs, the department has access to performances of students with respect to each CO.
- Hence, computing the direct attainment of COs from CIE is straight forward for Tier 2 institutes.

### **Direct CO attainment from SEE**

- However, Semester End Examination (SEE) is conducted and evaluated by the University (VTU) in Tier 2 institutes. Thus the departments get only total marks scored in SEE and not question-wise marks!
- The average marks in SEE taken as the common attainment of all COs (Equal Weightage to all COs).

## CO-PO attainment Computation Procedure:

**STEP-1:** For every subject 5-7 course outcomes (CO) are defined and mapped to Program outcomes (PO) on a scale of 1 to 3. Highest correlation is 3. For example as shown in fig. 1 and fig. 2

Number of Course Outcomes for the course - C311		5	Set Target(%)		
CO No	Statements of Course Outcomes	MARKS	ATN	BL	
C311.1	Apply finite element methods to solve engineering problems, formulate boundary conditions, and select appropriate elements.	70	60	3	
C311.2	Use finite element methods to analyze 1D bars, trusses, and 2D elements, using higher-order interpolation and numerical integration	70	60	3	
C311.3	Evaluate displacement, stress, and torsion in beams and shafts using finite element analysis and appropriate boundary conditions.	70	60	3	
C311.4	Implement finite element methods to analyze heat transfer and fluid flow, emphasizing conduction, convection, and radiation.	70	60	3	
C311.5	Solve axisymmetric and dynamic problems using finite element methods for mass, stiffness, and eigenvalue analysis.	70	60	3	

**Fig 1. Course Outcome's ID, Description, Target marks in percentage and Blooms Level**

11	CO-PO Mapping Table (In the scale of 3)												CO-PSO Mapping Table					
12	CO/PO	1	2	3	4	5	6	7	8	9	10	11	12	CO/PO	1	2	3	4
13	C311.1	2	3	1	2	1	2		1	1	1		2	C311.1		1		
14	C311.2	2	3	1	1		2		1				1	C311.2		1		
15	C311.3	2	3	1	1		2		1				1	C311.3		1		
16	C311.4	2	3	2	2		2		1				1	C311.4		2		
17	C311.5	2	3	2	1		2		1				1	C311.5		2		
18																		
19																		
20																		
21																		
22																		
23	<b>Total</b>	10	15	7	7	1	10		5	1	1		6	<b>Total</b>		7		

**Fig 2. Mapping of Course Outcomes to the Program Outcomes (POs) and Program Specific Outcomes (PSOs)**

**STEP 2:** Maximum marks allotted to each question, mapped to a cognitive level and the corresponding CO. Record the percentage of students achieving a set percentage of max marks allotted to an individual CO in a given IAT. For example as shown in fig.3 ,


	A	B	C	D	E	F	G	H	I	J	K	L	
1		<b>AIT/NBA/ CIE-MARKS/ 2023-24</b>	 <b>ACHARYA INSTITUTE OF TECHNOLOGY</b> Bengaluru – 560 107 Department of Mechanical Engineering										
2													
3		<b>Course Title:</b>	FINITE ELEMENT METHODS										
4		<b>Course Code:</b>	18ME61	<b>Semester &amp; Section</b>				6 - A	<b>No.Students</b>	10			
5		<b>Course Instructor Name:</b>	Dr. MANJUNATHA B					<b>Course ID:</b>	C311				
6			Test No:1										
7		<b>Ref-Question Number:</b>	1	2	3	4	5	6	7	8	9	10	
8			CIE Marks Entry Format For the Academic Year - 2022-23										
9		<b>Questions</b>	1,2	3,4	5,6	7,8		cra1	cra2	asg1	asg2		
10		<b>Main Question No.</b>	1	2	3	4		1	2	1	2		
11		<b>Mapped CO-No.</b>	1	1	2	3		2	4	5	5		
12		<b>Sl.</b>	<b>USN/Q-Marks</b>		10	10	15	15		10	10	10	10
13	1	1AY20ME400	10	8	13	14		9	4	10	9		
14	2	1AY20ME401	10	8	12	15		8	9	6	10		
15	3	1AY20ME402		8	10	14		6	8	5	5		
16	4	1AY20ME403	2	8	15	15		7	4	9	5		
17	5	1AY20ME404	4	10	4	14		10	10	10	6		
18	6	1AY20ME405	8	6	10	12		8	9	7	5		
19	7	1AY20ME406	10	8	10	14		5	5	9	8		
20	8	1AY20ME407	5	8	15	15		5	8	5	9		
21	9	1AY20ME408	10	8	6	8		10	4	9	10		
22	10	1AY20ME409	5	9	5	15		5	9	4	3		

Fig 3. CIE Marks Entries against each CO and Student wise

Below table summarizes the CO attainment calculation and interpretation of Excel Template values

Sl.	USN	Max Marks -20 & Sum of Scored marks against CO-1 only	CO attainment Calculation For CO-1 Refer Qn No. 1 & 2	Attainment of CO
1	1AY20ME400	18	$(18/20)*100 = 90\% \Rightarrow 70\%$	CO Attained
2	1AY20ME401	18	$(18/20)*100 = 90\% \Rightarrow 70\%$	CO Attained
3	1AY20ME402	8	$(8/10)*100 = 80\% \Rightarrow 70\%$	CO Attained
4	1AY20ME403	10	$(10/20)*100 = 50\% \leq 70\%$	<b>CO Not Attained</b>
5	1AY20ME404	14	$(19/20)*100 = 95\% \Rightarrow 70\%$	CO Attained
6	1AY20ME405	14	$(14/20)*100 = 70\% \Rightarrow 70\%$	CO Attained
7	1AY20ME406	18	$(18/20)*100 = 90\% \Rightarrow 70\%$	CO Attained
8	1AY20ME407	13	$(13/20)*100 = 65\% \leq 70\%$	<b>CO Not Attained</b>
9	1AY20ME408	18	$(18/20)*100 = 90\% \Rightarrow 70\%$	CO Attained
10	1AY20ME409	14	$(14/20)*100 = 70\% \Rightarrow 70\%$	CO Attained

Refer to the Excel template.

By executing the attainment command, you will get either 1 or blank (empty). 1 means attained Blank (empty) means not attained.

This indicates that the scored marks percentage is less than or greater than the threshold percentage

Sl.	USN	Course Outcome Number	CO1	CO2	CO3	CO4	CO5						
		Total Maximum Marks	20	25	15	10	20						
1	1AY20ME400	ABHILASH	1	1	1		1						
2	1AY20ME401	ABHISHEK H	1	1	1	1	1						
3	1AY20ME402	AKASH R N	1		1	1							
4	1AY20ME403	AKRAMKHAN H		1	1		1						
5	1AY20ME404	AKSHAY L	1		1	1	1						
6	1AY20ME405	ANIKETH S	1	1	1	1							
7	1AY20ME406	BADRI TELU	1		1		1						
8	1AY20ME407	BORAPPANAYAKA		1	1	1	1						
9	1AY20ME408	CHAITRANJALI	1				1						
10	1AY20ME409	CHANDAN C	1		1	1							
p. Students Attained			8	5	9	6	7						
Total Students			10	10	10	10	10						
% Attainment			80	50	90	60	70						
Attainment Level			3	1	3	2	3						

Fig 4. Number of students attained, Total students, Percentage of attainment and Attainment Level

**STEP 3:** Performances of a student from CIE (Two/three IA and Assignments) are used for calculating attainment levels for CO1. The process is described below.

**Condition IF S3 % of students score  $\geq$  M3% of Max marks allotted to CO - Attainment Level 3**

**ELSE IF S2% of students score  $\geq$  M2% of Max marks allotted to CO - Attainment Level 2**

**ELSE IF S1% of students score  $\geq$  M1% of Max marks allotted to CO - Attainment Level 1**

In our Institute we have set % of student S3, S2, S1 as 70%,60%,40% and % marks M3,M2,M1 as 60%

CIE, SEE, CES - Threshold Values for Attainment Levels							Set Target Percentage			
Attainment level	3	%	2	%	1	%	Marks	Attainment		
Internal Assessment, IA	$\geq$	70	$\geq$	60	$\geq$	40	SEE, %	50	SEE, %	60
SE Examination, SEE	$\geq$	60	$\geq$	50	$\geq$	40	Set Target Level & Percentage			
Course End Survey, CES	$\geq$	70	$\geq$	60	$\geq$	40	CES, L	3	CES, %	60

Fig 5. Different Attainment Levels and Threshold Values for Different Components of TLP

**STEP 4:** Repeat the above condition to evaluate all COs

**STEP 5:** Calculate the CO attainment of the course based on CIE and VTU University Examinations using the below formula.

<p>Attainment Level = <math>\left(\frac{\text{Number of Students Attained}}{\text{Total Students}}\right) \times 100</math></p> <p>Example: Attainment level 3 = <math>\left(\frac{8}{10}\right) \times 100 = 80\%</math></p> <p>Refer the Threshold Table for deciding Attainment level</p> <p>The Calculated <b>80%</b> is more than <b>70%</b>, therefore CO-1 Attainment Level is <b>3</b></p> <p><b>Note: Same Procedure shall be followed for calculating other CO attainment Levels</b></p>
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<b>For Internal Exam</b>
Level 3 is 70% of students scoring $\geq 60\%$ of marks allocated to CO.
Level 2 is 60% of students scoring $\geq 60\%$ of marks allocated to CO.
Level 1 is 40% of students scoring $\geq 60\%$ of marks allocated to CO.

**CO Attainment Calculation Procedure for the SEE (External Examinations)**

<p>If the student scores more than or equal to 50% marks. Such student attained in the COs. Refer the threshold table for deciding the Level of attainment. From the table,</p> <p>Level of attainment is 3 if number of students attained are <math>\geq 60\%</math></p> <p>Level of attainment is 2 if number of students attained are <math>\geq 60\%</math></p> <p>Level of attainment is 1 if number of students attained are <math>\geq 60\%</math></p>
---

49	Format for Entry of Semester End Examination Marks								50	50	100
50	Sl.	USN	NAME	CIE	SEE	TOT	Result	Class	ATNT	Grade	Rank
51	1	1AY20ME400	ABHILASH	34	47	81	PASS	FCD	1	9	1
52	2	1AY20ME401	ABHISHEK H	34	22	56	PASS	SC		6	4
53	3	1AY20ME402	AKASH R N	27	49	76	PASS	FCD	1	8	2
54	4	1AY20ME403	AKRAMKHAN H	24	32	56	PASS	SC	1	6	4
55	5	1AY20ME404	AKSHAY L	25	10	35	FAIL			0	8
56	6	1AY20ME405	ANIKETH S	27	42	69	PASS	FC	1	7	3
57	7	1AY20ME406	BADRI TELU	25	24	49	PASS	SC		4	7
58	8	1AY20ME407	BORAPPANAYAKA	33	22	55	PASS	SC		6	5
59	9	1AY20ME408	CHAITRANJALI	28	21	49	PASS	SC		4	7
60	10	1AY20ME409	CHANDAN C	27	25	52	PASS	SC	1	5	6

**Fig 6. Attainment of CO from the SEE**

The Level of attainment from the SEE is 2 as 50% students attained, i.e., the number of students obtained 50% and more are more than or equal to 50% but less than 60%. The total COs attainment from CIE and SEE is computed as described below


24	Weight %, for Final CO attainment (CIE+SEE+CES)						Weight %, CO Attainment			
25	CIE	60	SEE	40	CES	0	Direct	100	Indirect	0
26										

Fig 7. Weight Percentage allocated for CIE and SEE

Let us consider CO attainment from SEE is 3. Then the overall CO attainment is calculated as follows:

**Total CO1 attainment** = CO1 attainment from CIE x wt% + CO1 attainment from SEE x wt%

**Total CO1 attainment** = 3 x 0.6 + 2 x 0.4 = 2.6

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
1	AIT/NBA/ CO-PO-PSO REPT/ 2023-24		 <b>ACHARYA INSTITUTE OF TECHNOLOGY</b> Bengaluru – 560 107 Department of Mechanical Engineering												
2															
3	<b>Course Title</b>		FINITE ELEMENT METHODS								<b>Course Code</b>		C311		
4	<b>Subject Code</b>		18ME61		<b>Semester</b>		6		<b>Section</b>		A		<b>Emp.ID</b>		AI00024
5	<b>Faculty Name</b>		Dr. MANJUNATHA B								<b>No.students</b>		10		
6															
7	<b>Summary of CO attainments of Sub: 18ME61 in the Academic Year:2023-24</b>														
8	<b>CO</b>	<b>CID_CO</b>	<b>CIE</b>			<b>SEE</b>			<b>CES</b>			<b>TOT_Attainment</b>			
<b>S_AT</b>			<b>T_ST</b>	<b>ATN</b>	<b>S_AT</b>	<b>T_ST</b>	<b>ATN</b>	<b>S_AT</b>	<b>T_ST</b>	<b>ATN</b>	<b>ATN</b>	<b>%</b>	<b>Status</b>		
10	CO1	C311.1	8	10	3	5	10	2				2.6	87	YES	
11	CO2	C311.2	5	10	1	5	10	2				1.4	47	NO	
12	CO3	C311.3	9	10	3	5	10	2				2.6	87	YES	
13	CO4	C311.4	6	10	2	5	10	2				2	67	YES	
14	CO5	C311.5	7	10	3	5	10	2				2.6	87	YES	
15															

**STEP 7 Program outcomes attained through the attainment of COs.** For a given course, all COs are mapped to certain POs, as shown in STEP 1. The overall CO attainment value as computed in STEP 7 and the CO-PO mapping values given in the STEP 1 used to compute the attainment of POs.

**Course wise PO attainment can be computed for a course using the below formula.**

$$\text{Attainment of PO1} = \frac{(\text{Mapped Value of CO} - 1 \text{ to PO 1}) / \text{Sum of Mapped Values for PO1} + (\text{Mapped Value of CO} - 2 \text{ to PO 1}) / \text{Sum of Mapped Values for PO1}, + \dots}{\text{Sum of Mapped Values for PO1}, + \dots}$$

Note: Consider the COs which are mapped to PO-1 only, Refer the Table shown in Figure 2

PO attainment is calculated as follows (Note: Total of CO as follows)

CO1 = 2.6, CO2 = 1.4, CO3 = 2.6 (Calculations are described above, but for CO4 = 2.0 and CO5 = 1.8 are considered for the reference and understanding purpose only)

**PO-1 attainment** = (2/11) x CO-1 attainment + (2/11) x CO-2 attainment+ (2/11) x CO-3 attainment+ (2/11) x CO-4 attainment+ (2/11) x CO-5 attainment

$$\text{PO-1 attainment} = (2/7) \times 2.6 + (1/7) \times 1.4 + (2/7) \times 2.6 + (1/7) \times 2.0 + (1/7) \times 2.6 = 2.2$$

Summary of PO attainments of Sub: 18ME61 in the Academic Year:2023-24												
PO Number	1	2	3	4	5	6	7	8	9	10	11	12
Direct ATNT(D)	2.2	2.2	2.3	2.3	2.6	2.2		2.2	2.6	2.6		2.3
Indirect ATNT(ID)	0	0	0	0	0	0		0	0	0		0
Total-ATNT	2.2	2.2	2.3	2.3	2.6	2.2		2.2	2.6	2.6		2.3
Total-ATNT (%)	73	73	77	77	87	73		73	87	87		77

**Fig 8. Table shows PO attainment from direct (CIE+SEE), indirect (CES) and Total attainment (Direct + Indirect)**

**STEP 8** PO attainment can be computed for a batch using the below formula. Indirect attainment is determined from student exit surveys, employer surveys, co-curricular activities, extracurricular activities and mapped to POs. A questionnaire was designed for this purpose and the average response of the outgoing students for each PO is computed.

**Batch PO attainment can be computed for a batch using the below formula.**

**PO/PSO attainment = (CO attainment \* CO-PO Mapping)/Max correlation strength**

**Final PO attainment for a particular batch = 0.8 \* Direct Attainment + 0.2 \* Indirect attainment**

### **CO Assessment Process for Various Courses in The Curriculum**

Course outcomes of all courses are assessed with the help of below-mentioned assessment tools and attainment level is evaluated based on set attainment rubrics. The curriculum is a bundle of various components like Theory courses, Theory with Lab components, Laboratory courses, Mini-Projects, Projects and Internships /Implant training / Technical seminar.

Theory Courses				
Method	Assessment Tools	Marks	weightage	Regulation
Direct Assessment	Continuous Internal Evaluation	40		2018
	Semester End Examination	60		
Indirect assessment	Course End survey			
Direct Assessment	Continuous Internal Evaluation	50		2021 & 2022
	Semester End Examination	50		

Indirect assessment	Course survey	End			
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Mini/Main Projects					
Method	Assessment Tools	Marks	weightage	Regulation	
Direct Assessment	Continuous Internal Evaluation	40			
	Semester End Examination	60			
Indirect assessment	Course survey	End			

Internships/Technical Seminar					
Method	Assessment Tools	Marks	weightage	Regulation	
Direct Assessment	Continuous Internal Evaluation	40			
	Semester End Examination	60			
Indirect assessment	Course survey	End			

## Sample CO Attainment Calculations

### CO attainment from the Marks

Threshold Values for Attainment Calculation						
Attainment level	3	%	2	%	1	%
Internal Assessment	>=	70	>=	60	>=	40
SE Examination	>=	60	>=	50	>=	35

Questions	1,2	3,4
Main Question No.	1	2
Mapped CO-No.	1	2
Sl. USN/Q-Marks	10	10
1 BT001	9	10
2 BT002	6	4
3 BT003	5	8
4 BT004	10	8
5 BT005	9	7
6 BT006	5	7
7 BT007	4	8
8 BT008	3	9
9 BT009	10	10
10 BT010	8	9

Questions	1,2	3,4
Main Question No.	1	2
Mapped CO-No.	1	2
Sl. USN/Q-(%)	100	100
1 BT001	90	100
2 BT002	60	40
3 BT003	50	80
4 BT004	100	80
5 BT005	90	70
6 BT006	50	70
7 BT007	40	80
8 BT008	30	90
9 BT009	100	100
10 BT010	80	90
70% and above		5 9

Number of Students having

### CO-1 Attainment Calculation

$$= \frac{5}{10} \times 3 = 1.5 \quad \text{1.5 means 50 \% students have } \geq 70 \% \text{ Marks}$$

### CO-2 Attainment Calculation

$$= \frac{9}{10} \times 3 = 2.7 \quad \text{2.7 means 90 \% students have } \geq 70 \% \text{ Marks}$$

Attainment Level						
Level	3	%	2	%	1	%
%	>=	70	>=	60	>=	40
Range	>=	2.1	>=	1.8	>=	1.2

### CO-1 Attainment Level

Attainment value = 1.5

Attainment level = 1

### CO-2 Attainment Level

Attainment value = 2.7

Attainment level = 3

### PO attainment from the Matrix of CO-PO mapping

CO-PO Mapping Table												
PO	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2											
CO2	1	2										
CO3	2	2	1									1
CO4	1	2	1									1

(Reference values only)

Total		
CIE-60	SEE-30	CES-10
		1.2
		2.0
		0.2
		2.0

PO - Weight and Attainment												
Total	6	6	2									2
Attainment	1.1	1.4	1.1									1.1

$$\text{PO-1 attainment} = (2/6) * \text{CO-1} + (1/6) * \text{CO-2} + (2/6) * \text{CO-3} + (1/6) * \text{CO-4}$$

$$= (2/6) * 1.2 + (1/6) * 2.0 + (2/6) * 0.2 + (1/6) * 2.0$$

$$= 1.13 \quad (\text{It means } 1.13/3 = 37.7 \% \text{ PO-1 attained, or } 2.26 \text{ out of } 6 \text{ PO-1 attained})$$

## 11. PROGRAM OUTCOME (PO)/PROGRAM SPECIFIC OUTCOME (PSO) Assessment

At the end of the each program, the PO/PSO assessment is done from the CO attainment of all curriculum components. As per NBA guidelines, program can appropriately define the attainment level. For the evaluation and assessment of PO's and PSO's, assessment tools are used.

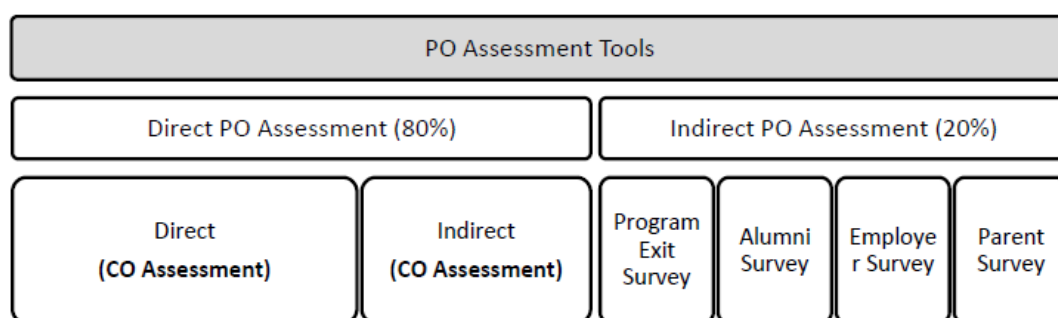
## All (Direct + Indirect) CO assessment tools = PO Direct assessment tools

### Sample CO assessment Tools

- CIE
- SEE
- Quiz
- Assignment
- Practical/ Lab work
- Industrial Visit, Workshop
- Other Task/Activity
- Course End Survey

**Direct Tools:** (Measurable in terms of marks and w.r.t. CO) Assessment done by faculty at Department level

**Indirect Tools:** (Non measurable in terms of marks and w.r.t. CO) Assessment done at Department Level



The Program Outcome (PO) attainment and Program Specific Outcome (PSO) attainments are evaluated by direct method with 80% weightage and indirect method with 20% weightage. The Direct attainment level of Particular PO /PSO is determined by taking average of all course outcomes mapping that program Outcome.

Indirect attainment level of PO/PSO is determined based on Surveys and Co-curricular activities. Out of 100%, 30% weightage is given to co-curricular activities and 70% weightage to Surveys. This 100% weightage is converted to 20 % scale for PO attainment calculation.

The various Surveys taken are Student exit survey, Employer survey, Alumni survey and Parents feedback. The co-curricular activities are Value added Courses, Workshops etc related to the unattained POs(less mapped POs in CO-PO matrix). The PO/PSO Attainment Level is fixed as Maximum level of 3 & Minimum level of 1.

**Course End Survey:** The course end survey is based on the feedback taken from the students after studying each course.

**Graduate Exit survey:** The graduate exit survey is based on the feedback collected from graduates at the end of the program.

**Alumni Feedback:** This feedback is about how effectively they can able to implement their knowledge acquired through BE- Programme in their workplace.

**Employer Feedback:** This feedback is about how alumni of department can able to implement their knowledge in the company.

**Parent’s Feedback:** This feedback is collected from the parents about their satisfaction in the knowledge, skill and employment level of their wards.

Co-curricular activities:

- Workshops
- Placement training programs
- Value added courses in Modern trends

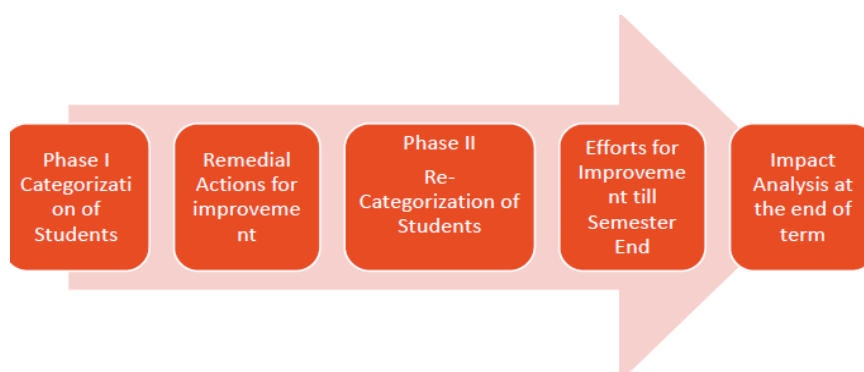
**Batch PO attainment can be computed for a batch using the below formula.**

**PO/PSO attainment = (CO attainment \* CO-PO Mapping)/Max correlation strength**

**Final PO attainment for a particular batch = 0.8 \* Direct Attainment + 0.2 \* Indirect attainment**

## 12. STUDENT COMPETENCY

Chart of action plan for categorization of students as slow learners, average learners and advanced learners.



### Guidelines for First Year

Phase I- Categorization (After 15 Days of start of semester)	Phase II- Re-categorization (After CIE Result)
12th Marks	CIE Result
Prerequisite Test	Timely Completion of work
Surprise Test after 15 days	Lab Performance
Attendance & Behaviour	Attendance & Behaviour
Previous Semester University Result (Applicable for Sem-II)	

### Guidelines for Higher Classes

Phase I- Categorization (After 15 Days of start of semester)	Phase II- Re-categorization (After CIE Result)
Previous semester University Result whichever is available	CIE Result
Prerequisite Test	Timely Completion of work
Surprise Test after 15 days	Lab Performance
Attendance & Behaviour	Attendance & Behaviour
Previous semester University Result	

### **Base Score for student category**

<40% - Slow Learner

40% to 65% - Average Learner

>65% - Advanced Learner

### **Strategies for Slow, Average and Advanced Learners**

#### ***For Slow learners***

- Document/record of remedial classes with timetable & attendance
- Specially designed assignment/ task
- Student study group for peer-to-peer learning
- Individual Counselling

**Note: Remedial sessions should be conducted once every week**

#### ***For Average Learners***

- Additional assignment/ task
- Encouraging for timely and effective completion of work
- Conduction of quiz, orals etc.
- Solving previous year University question papers and test papers
- Presentation on technical topics/ case studies/mini projects

**Note: Activities should be on continuous basis**

#### ***For Advanced Learners***

- Encouraging to present & publish papers in journals/conferences/competitions
- Guidance for GATE/ competitive Examination
- Encouraging to participate in professional activities.
- Special guidance for career building

**Note: Activities should be on continuous basis**

### 13. CONTINUOUS IMPROVEMENT

#### A) Contribution of CO in PO attainment and Continuous Improvement (Faculty Level)

Outcome	Action to be taken by faculty
All CO-PO attained highly (>2.5 out of 3)	Set new higher targets or attainment levels for next Academic Year (A.Y.).
All CO-PO attained moderately (1.8 to 2.49 out of 3)	Record observations, Continue action plan of last A.Y. with plan for improvements.
All CO-PO attained lowly (0.9 to 1.79 out of 3)	Record observations, assess the target set, revise/improve action plan of last A.Y. to achieve the attainment with plan for improvements.
CO-PO not attained, poor performance (<0.9 out of 3)	Record observations, Critical assessment of target with Program Assessment Committee (PAC), Revise action plan of last A.Y. at faculty/department level.

#### B) PO attainment and Continuous Improvement (PC and HoD Level)

Category	Outcome	Action by PC and HoD
Course related	PO attained highly	Include activities with HOD.
	PO not attained highly	Identify concerned courses, plan for immediate improvements, guide, support and monitor its execution.
Activity related	Activities Conducted	Critical assessment, impact analysis to be done and revise as per the need for improvements

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