OUTCOME BASED EDUCATION (OBE) MANUAL
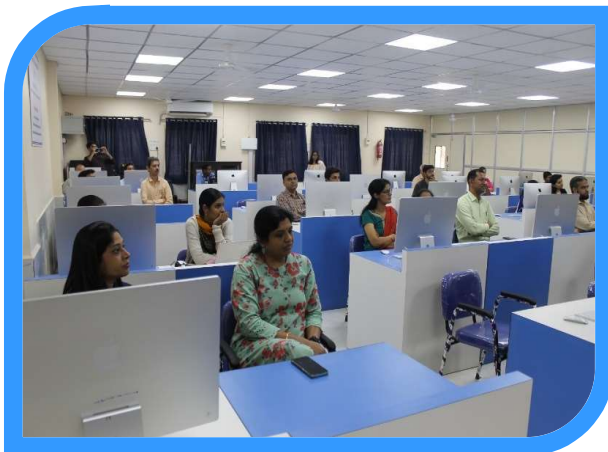
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XAVIER INSTITUTE OF ENGINEERING
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LIST OF TABLES

VISION AND MISSION

Vision of the Institute

✓ To nurture the Joy of Excellence in a world of High Technology.

Mission of the Institute

✓ To strive to match global standards in Technical Education by Interaction with Industry, Continuous Staff training and Development of quality of life.

Refer Annexure-1 For PO's

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1

- ## Process of Defining the Vision and Mission
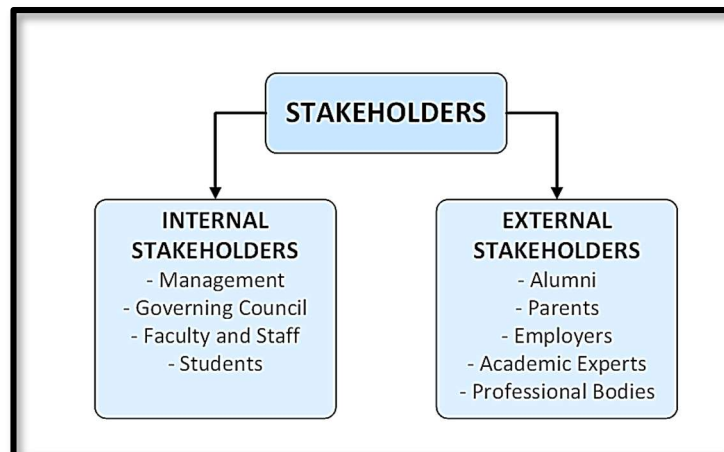
Figure 1.1 Internal and External Stakeholders

A. **Description of process involved in defining Vision and Mission of the Department:**

The vision and mission statements of the Department are established through a thorough consultation process that involved the stakeholders of the Department. The inputs from Alumni, Program Assessment Committee (PAC) and Department Advisory Board (DAB) were used in framing the Vision and Mission Statements of the Department and aligned with the Institutional Vision and Mission Statements.

Step1: PAC members initially drafted the vision and mission statements taking into consideration the departmental expertise and available resources which are also in alignment with the vision and mission of the institute.

Step 2: The vision and mission statements, defined as stated in step-1 were shared with faculty, students, alumni, management to get their feedback.

Step 3: The feedbacks so obtained from the stakeholders in step-2 were discussed among PAC members before finalization.

Step 4: The new vision and mission statements (outcome of the PAC meeting) were placed before DAB and management for their recommendation.

Step 5: The finalized vision and mission statements are published in the website and other places stated in 1.2.

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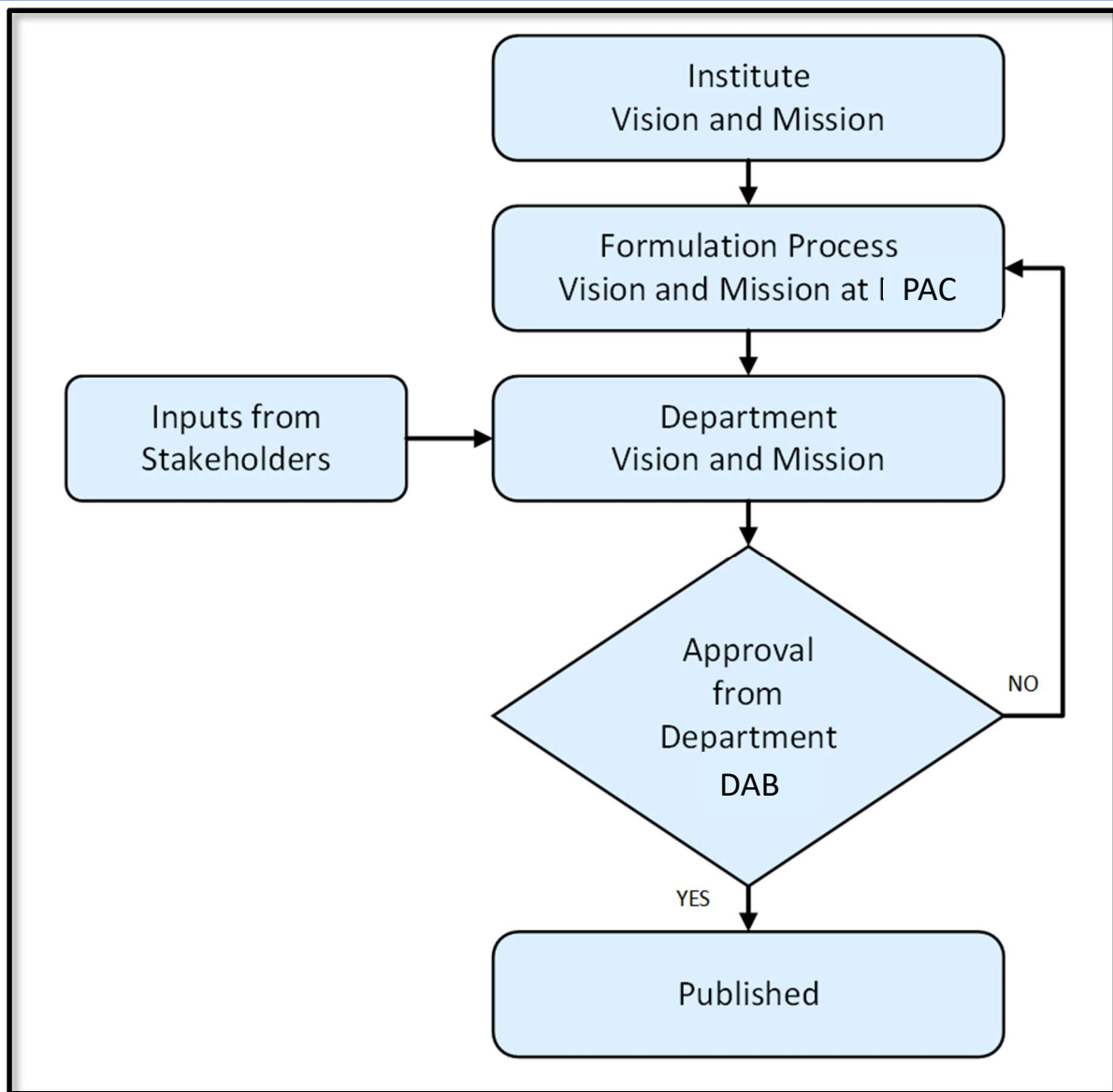
Figure 1.2 Process of Defining the Vision and Mission of the Department

The process of defining the vision and mission of the department is shown in Figure 1.2. Every department has to follow the steps discussed in the flowchart in order to finalize the departmental vision and mission.

Refer Annexure-2 For PEO's and PSO's of the departments.

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B. Description of process involved in defining PEOs and PSOs of the Department:

The Program Educational Objectives and Program Specific Outcomes are established through a consultation process involving the stakeholders of the department such as students, alumni, faculty members and industry persons.

The PEOs are established through the following steps:

Step 1: The PEOs are initially drafted by the PAC members considering vision, mission statements of the institute and the Department, program outcomes and the curriculum.

Step 2: The drafted PEOs of step 1 were shared with the stakeholders to get their suggestions.

Step 3: PAC members summarized the feedbacks from the stakeholders and modified the PEOs/ PSOs.

Step 4: The modified PEOs/PSOs were put before the management and the DAB for finalization.

Step 5: After finalization the PEOs and PSOs were published at various places.
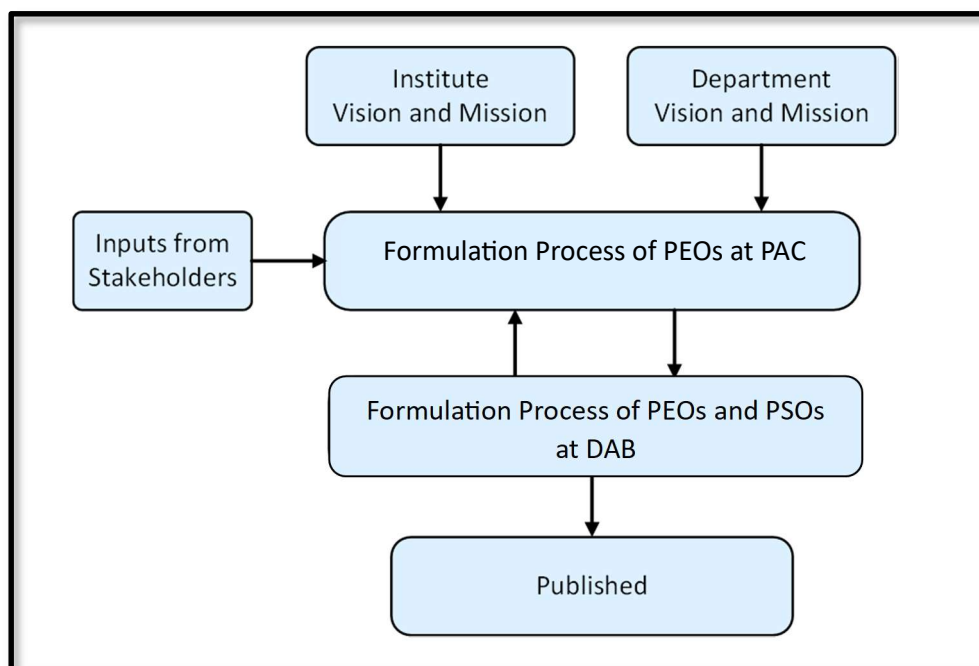
Figure 1.3 Flow Chart for Establishing the Program Educational Objectives and Program Specific Outcomes

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2 • Department OBE Framework

Department follows the OBE framework for the student-centric teaching & learning methodologies in which the course delivery and assessment are planned to achieve stated objective & outcomes. It focuses on measuring students' performance i.e. outcomes at different level.

Outcome Based Education (OBE) is an educational theory that bases each part of an educational system around what is essential for all students to be able to do successfully at the end of their learning experiences.

The Figure 2.1 illustrates the steps involved in assessing a program to determine if it is meeting its educational objectives.

I. The process begins by identifying the program's vision and mission. Then, program educational objectives (PEOs) are established. These are the long-term goals of the program that describe what students should be able to do after they graduate.

II. Next, program outcomes (POs) are developed. These are the specific skills and knowledge that students will gain by completing the program. Finally, course outcomes (COs) are identified. These are the learning objectives for each course in the program.

III. The Figure 2.1 then shows how these outcomes are assessed. Assessment tools are used to collect data on how well students are achieving the program

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outcomes. This data is then analyzed to see if the program is meeting its goals. If not, the program may need to be revised.

IV.   The framework also includes inputs and feedback from various stakeholders, including students, alumni, parents, professional organizations, and the university. This feedback is used to improve the program. Overall, the program assessment process is a continuous cycle that helps to ensure that programs are meeting the needs of their students and stakeholders.

V.   Overall, this OBE framework defines the process of providing inputs from graduate attributes from NBA, stakeholders, parents, etc. undergoing assessment methods till CO-PO analysis is completed.
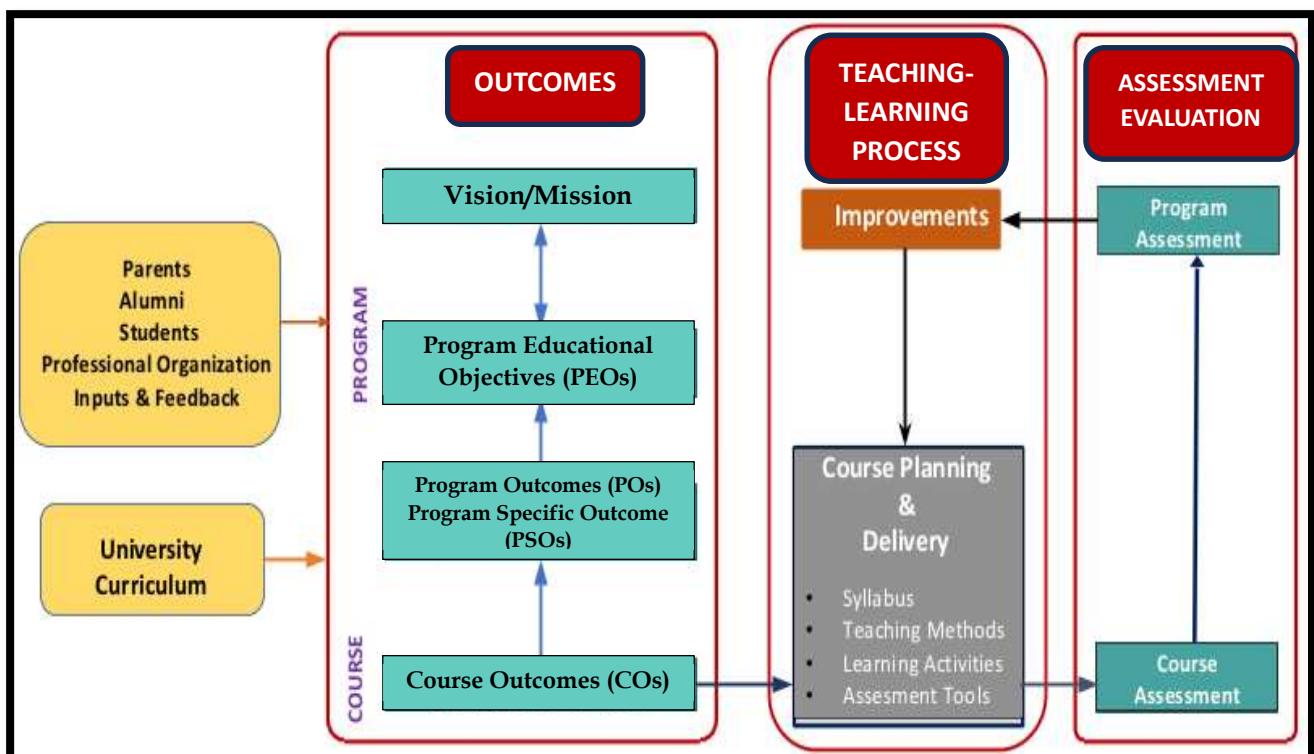
Figure 2.1 OBE Framework
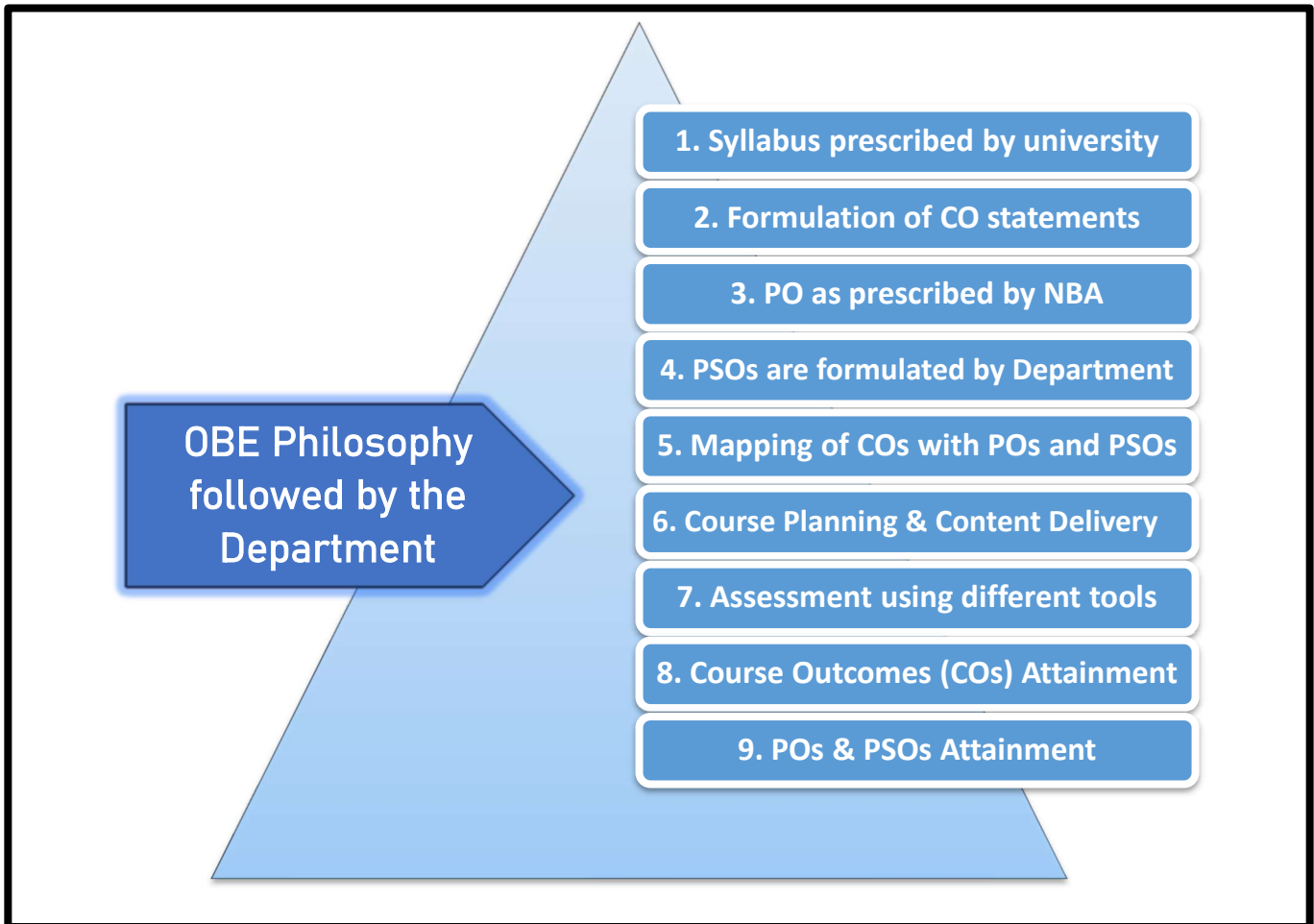
Figure 2.2 OBE Philosophy

Each department follows the OBE Philosophy in Figure 2.2. Initialy as per syllabus prescribed by university LO's statement are formulated. Mapping of CO's with PO's and PSO's of the department are done. Various tools are used for assessment. Finally CO, PO, and PSO attainment are evaluated.

3

- **Process of Framing CO Statements**
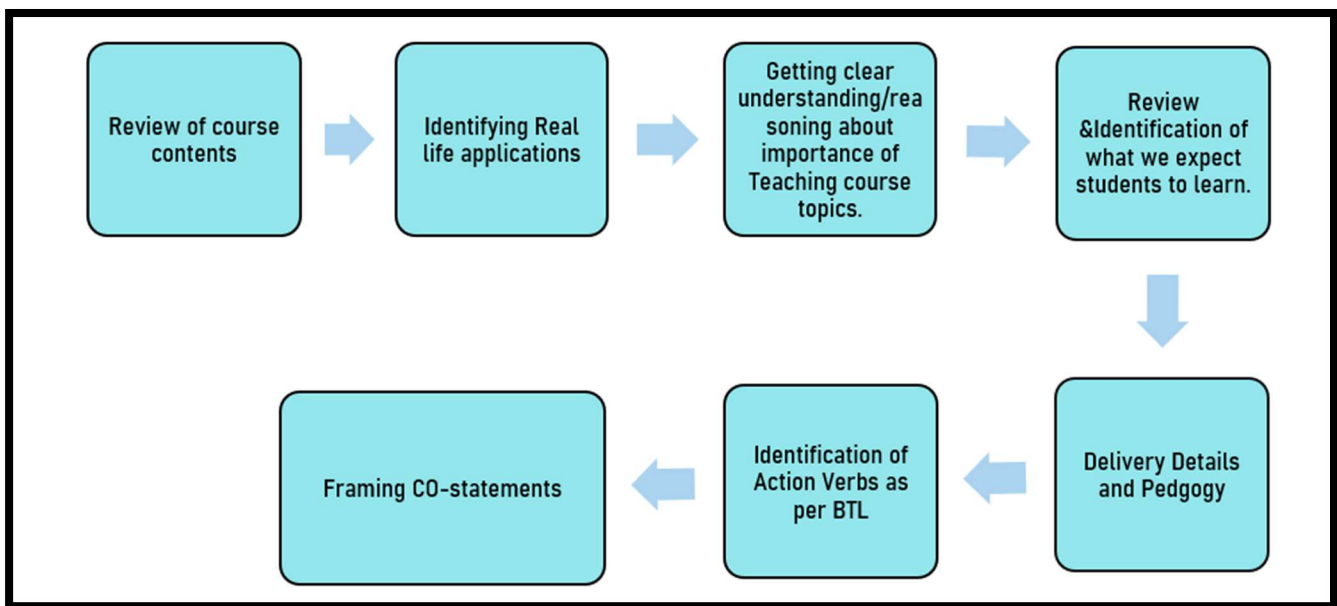
Figure 3.1 Process of Framing CO Statements

The Figure 3.1 outlines a structured approach to course design and delivery:

1**. Review of Course Contents:** Examine the topics and materials to be covered.

2. Identifying Real Life Applications: Connect the content to practical, real-world scenarios.

3. Understanding the Importance: Reflect on why each topic is significant for students.

4. Defining Learning Objectives: Specify what knowledge and skills students should acquire.

5. Planning Delivery and Pedagogy: Decide on instructional methods and strategies.

6. Using Bloom's Taxonomy: Identify action verbs for measurable learning objectives.

7. Framing Course Outcomes: Craft clear statements describing expected student achievements.

4 • <u>**Process for Identification of Curricular Gaps**</u>
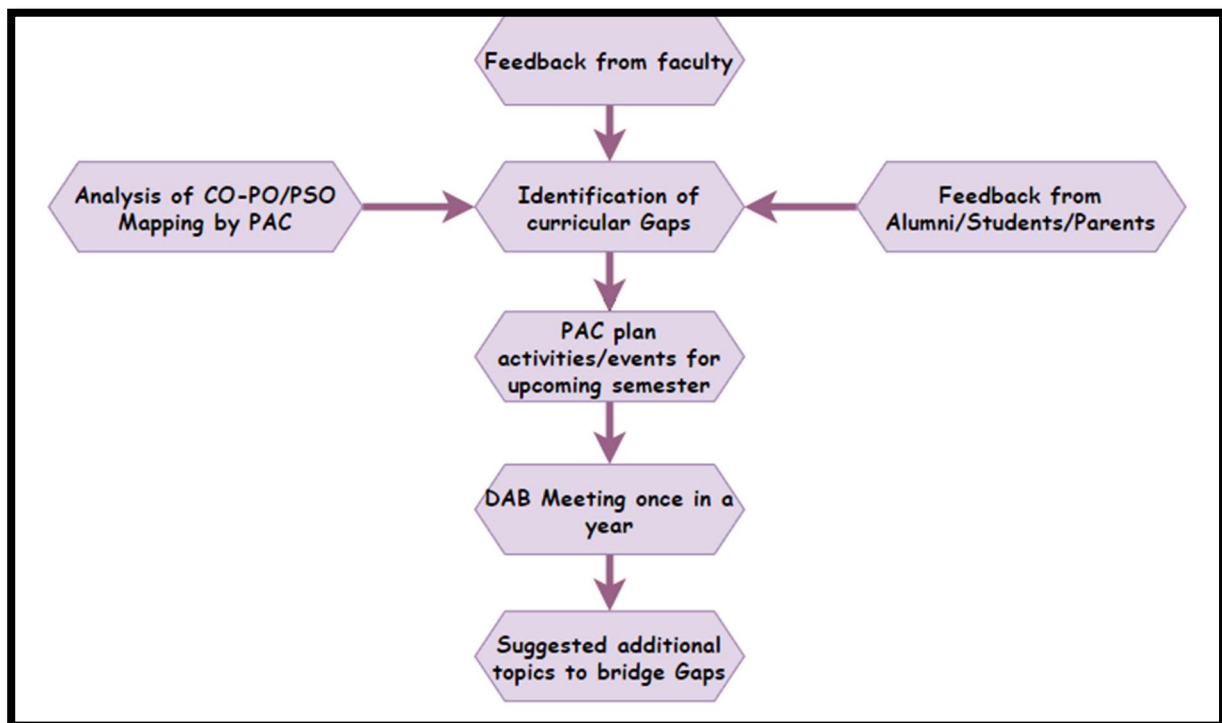
Figure 4.1 Process for Identification of Curricular Gaps

➢ Review the syllabus just after they subject allotment. They are looking for any gaps between the curriculum and the program's learning objectives.

➢ Once the curricular gaps are identified, faculty then forwards these gaps and their suggested solutions to the Program Assessment Committee (PAC).

➢ The next step involves mapping the course learning objectives (COs) to the program learning objectives (POs). This mapping process helps to identify any gaps between what is being taught in the courses and what the program is trying to achieve.

➢ These gaps are then discussed at a Departmental Advisory Board (DAB) meeting. After the discussion, the DAB may suggest action plans to bridge the gaps.

➢ Finally, the curricular gaps are communicated to the Board of Studies of the University of Mumbai. The process of identification of curricular gaps is shown in Figure 4.1.

➢ Measures to fill the curriculum gaps includes seminars, industrial visits, MOOC courses, value added courses, soft-skill training, internships, guest lectures and mini-projects. The measures are shown in Figure 4.2.

4.1 Measures to bridge curriculum gaps:
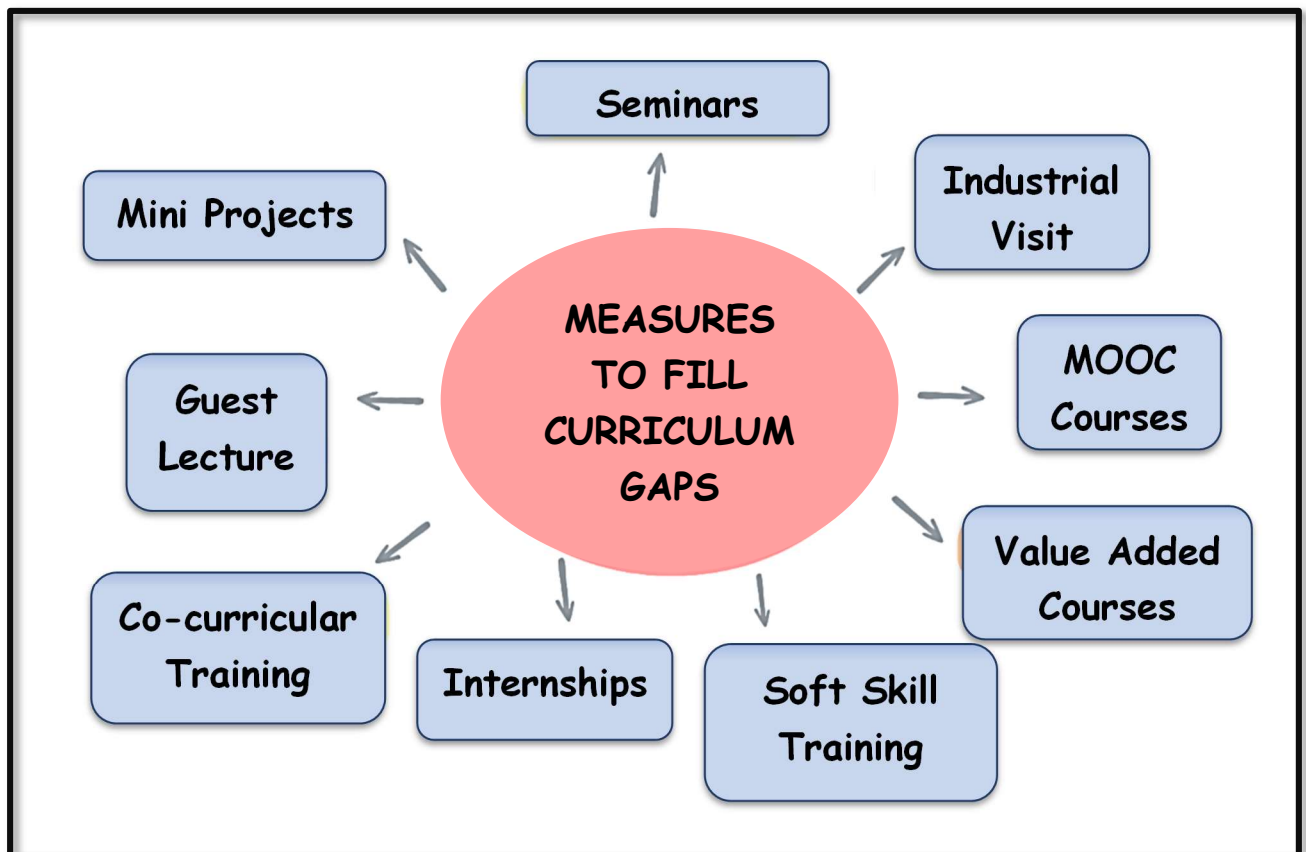
Figure 4.2 Measures to Bridge Curriculum Gaps

5 • Blooms Taxonomy

Blooms Taxonomy Levels and Verbs

Figure 5.1 Blooms Taxonomy

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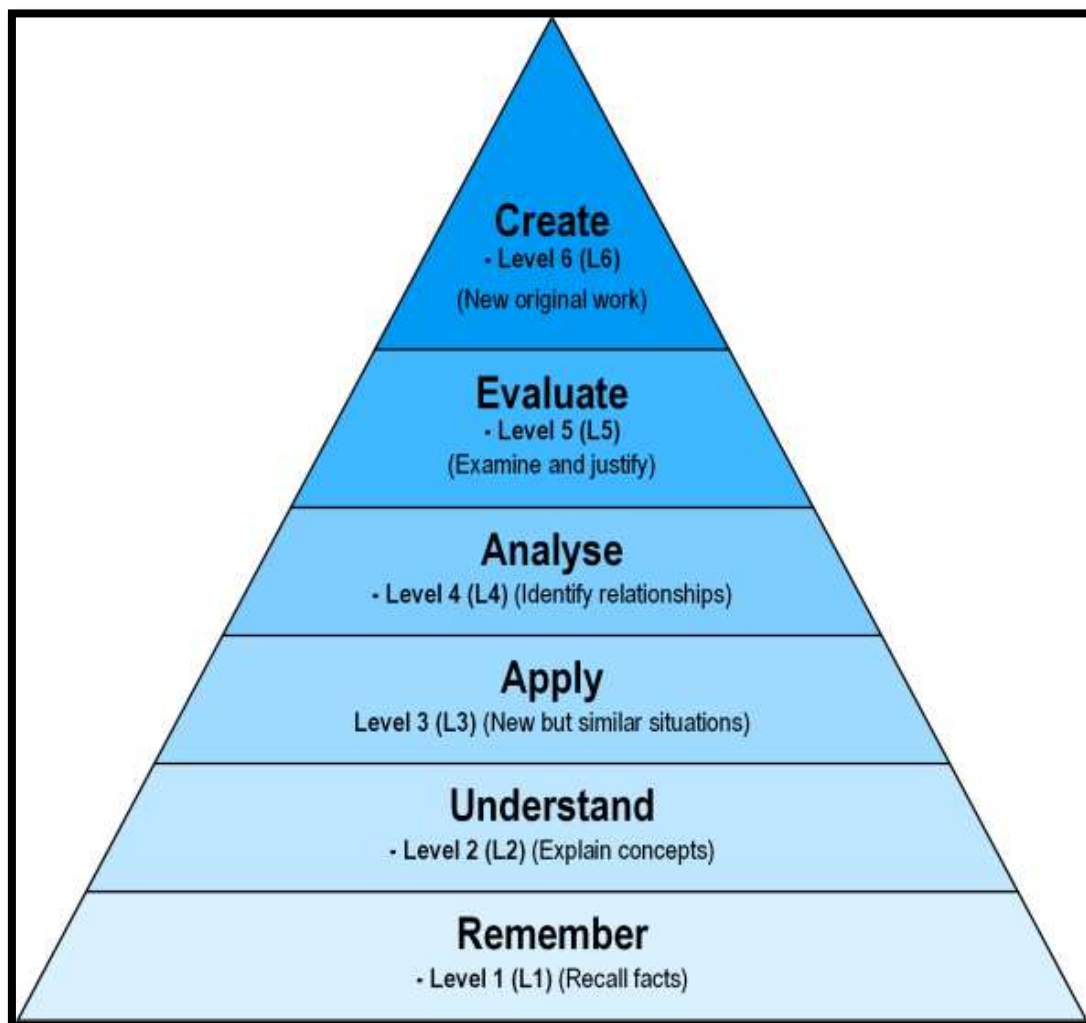
Some Bloom's Taxonomy Verbs

Level Name	1.Remembering	2.Understanding	3.Applying	4.Analyzing	5.Evaluating	6.Creating
Verbs	• Characterize • Choose • Cite • Define • Describe • Draw • Find • Indicate • Label • List • Match • Name • Omit • Outline • Read • Recall • Relate • Reproduce • Select • Show • Spell • State • Tabulate • Tell	• Classify • Compare • Comprehend • Contrast • Convert • Demonstrate • Derive • Describe • Differentiate • Discuss • Distinguish • Estimate • Explain • Express • Extend • Give examples • Illustrate • Infer • Interpret • Outline • Predict • Relate • Rephrase • Show • Summarize • Translate	• Apply • Build • Calculate • Change • Choose • Classify • Complete • Compute • Construct • Develop • Examine • Experiment with • Identify • Illustrate • Interpret • Interview • Make use of • Model • Organize • Plan • Relate • Review • Schedule • Select • Show • Sketch • Solve • Use • Utilize	• Analyze • Assume • Categorize • Classify • Compare • Conclude • Contrast • Deduce • Determine • Differentiate • Discover • Dissect • Distinguish • Divide • Examine • Experiment • Function • Identify • Illustrate • Infer • Inspect • Investigate • List • Outline • Relate • Select • Simplify • Summarize • Survey • Take part in • Test for	• Appraise • Assess • Award • Choose • Compare • Conclude • Contrast • Criticize • Decide • Deduct • Defend • Describe • Determine • Disprove • Estimate • Evaluate • Explain • Influence • Interpret • Judge • Justify • Mark • Measure • Perceive • Prioritize • Prove • Rate • Recommend • Relate • Revise • Select • Summarize • Support • Test	• Adapt • Arrange • Build • Change • Choose • Collect • Combine • Compile • Compose • Construct • Create • Delete • Design • Develop • Discuss • Elaborate • Estimate • Formulate • Improve • Integrate • Invent • Maximize • Minimize • Modify • Original • Plan • Predict • Propose • Revise • Rewrite • Solve • Specify • Synthesize • Test

Table 5.1 Blooms Taxonomy Verbs

6 • Course Delivery/ Assessment/ Evaluation Process
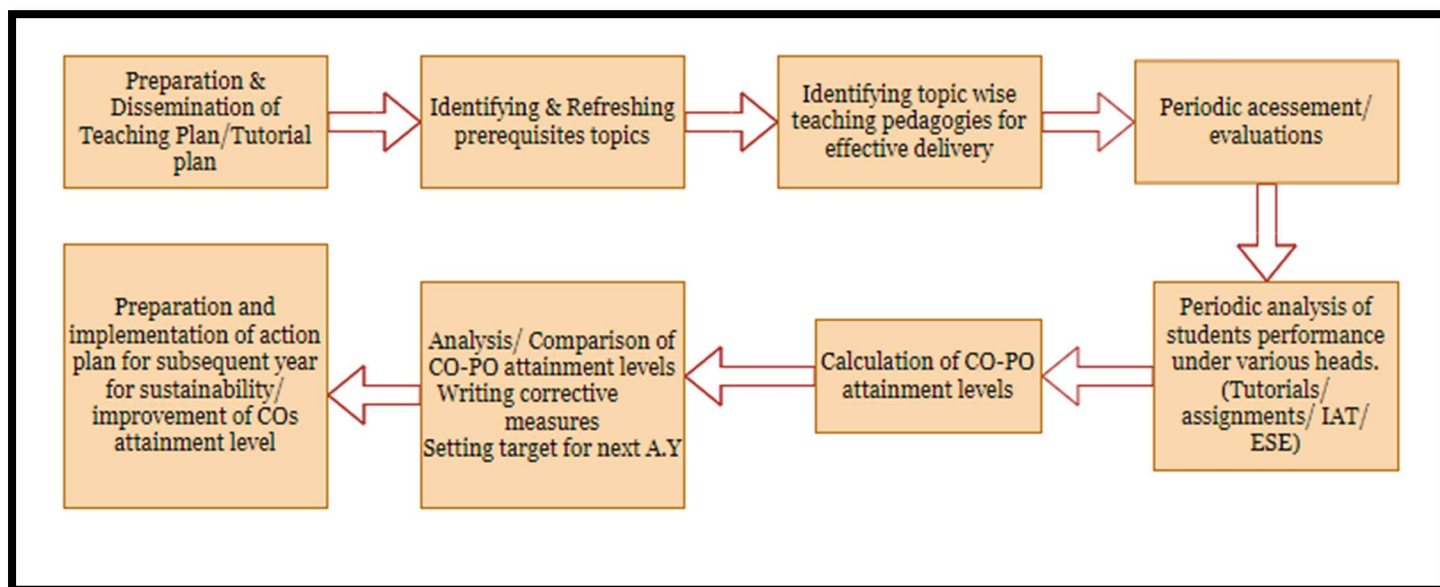
Figure 6.1 Course Delivery/ Assessment/ Evaluation

Process

- Course delivery- Pre-requisite topics for a particular course are introduced with proper teaching plan and methods for effective teaching.
- Various pedagogies and ICT tools are used for effective teaching such as smart boards, projectors, flip classrooms, etc.
- Assessment- Various assessment methods like conducting IAT's, end semester exam are carried out for performance analysis.
- File work of course including assignments and tutorials are also considered as a part of assessment.
- CO and PO attainment levels are calculated for each course. The CO-PO attainments are compared with the set targets for the current year and the analysis is done. Corrective plan of actions are proposed for sustainability/ improvement for subsequent year.

7 • <u>**Teaching Learning Process**</u>
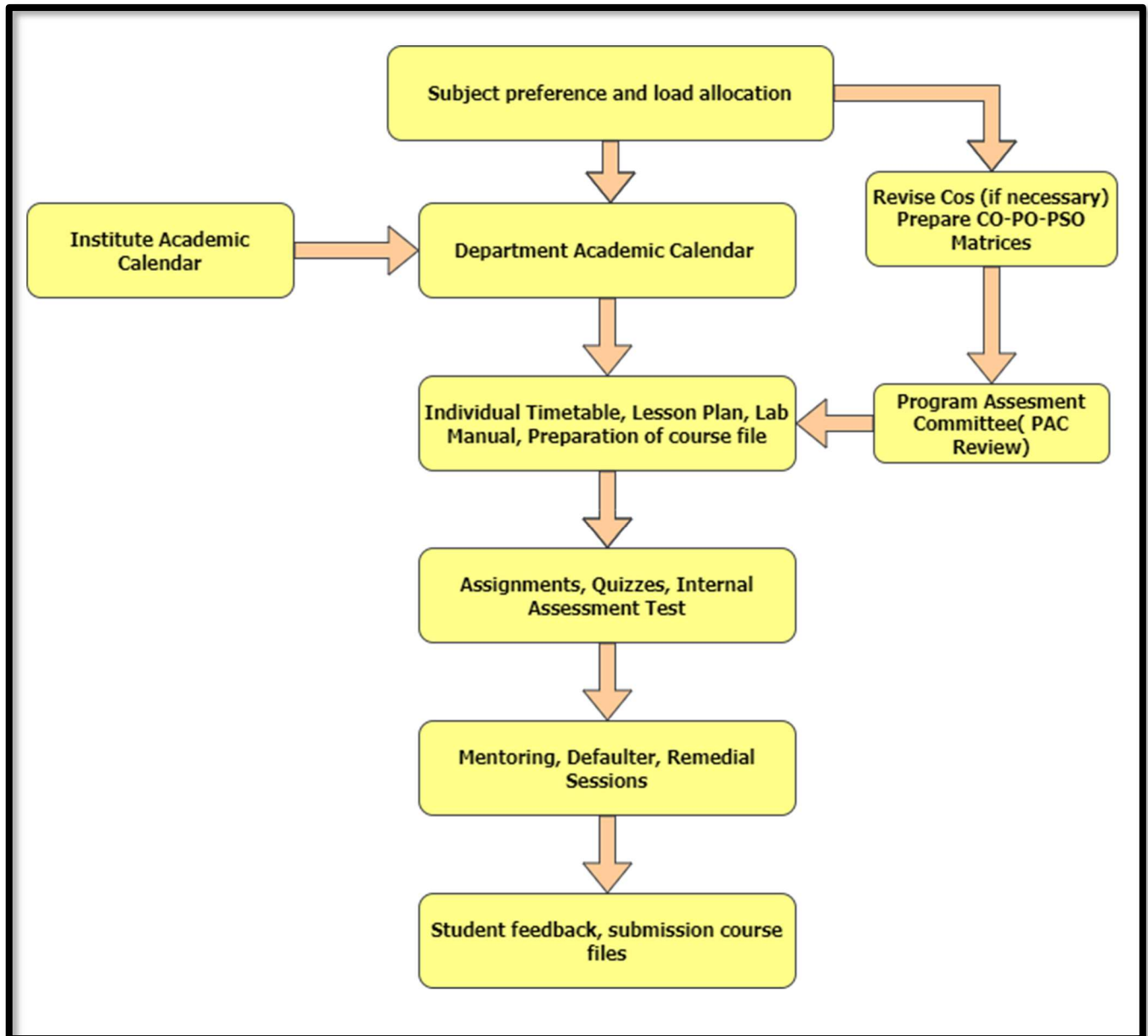
Figure 7.1 Teaching Learning Process

Step 1: Subject Preference and Load Allocation

- After subjects are assigned to faculty, they review the syllabus to identify any gaps between the course content and the program's learning objectives.

Step 2: Review Course (if necessary)

- Faculty revise the Course Outcomes (COs).

- They also develop a CO-PO-PSO Matrix.

Step 3: Departmental Academic Calendar

- This refers to the use of the approved syllabus and course schedule for the academic term.

Step 4: Institute Academic Calendar

- This refers to the university's overall academic calendar which includes holidays, exam periods, and other important dates.

Step 5: Individual Timetable, Lesson Plan, Lab Manual

- Faculty create individual timetables, lesson plans, and lab manuals based on the approved syllabus and course learning objectives.

Step 6: Program Assessment Committee (PAC) Review

- Faculty submit the CO-PO Matrix and any revisions made to the course syllabus to the Program Assessment Committee (PAC) for review.

Step 7: Assignments, Quizzes, Internal Assessment Test

- Faculty develop assessments to measure student learning based on the course learning objectives.

Step 8: Mentoring, Defaulter Sessions, Remedial Sessions

- Faculty provide additional support to students who are struggling to meet the course learning objectives.

Step 9: Student Feedback, Submission of Course Files

- Students provide feedback on the course and faculty submit the course files for review.

7.1 Effective Instructional Methods:
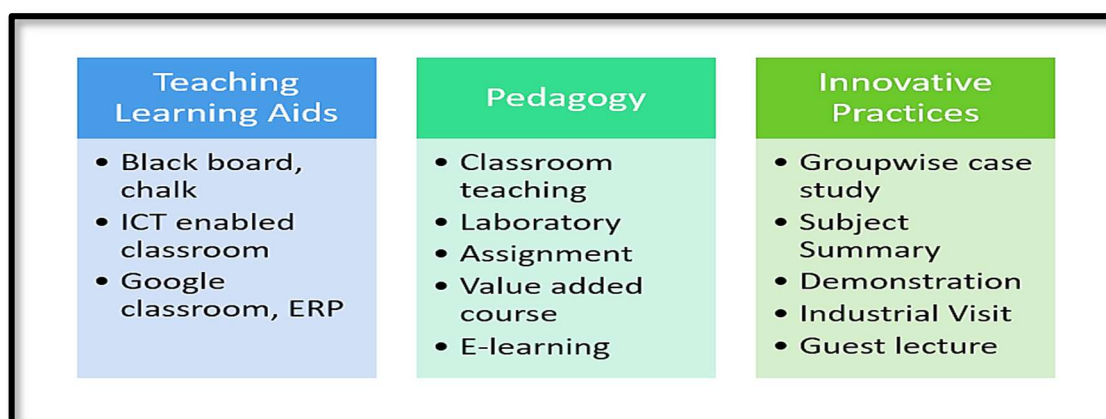
Figure 7.2 Effective Instructional Methods

7.2 Process to identify the slow and fast learners:

All students do not learn at the same pace. But the same learning has to take place without any discrimination. Therefore, IQAC of Xavier Institute of Engineering has devised a policy for finding out the slow and advanced learners. The objective of this policy is to bring all the students to the same level of learning. Guidelines led by the IQAC help in

upgrading the knowledge of slow learning students and also cater to the need of advanced learners. The process is shown as below:
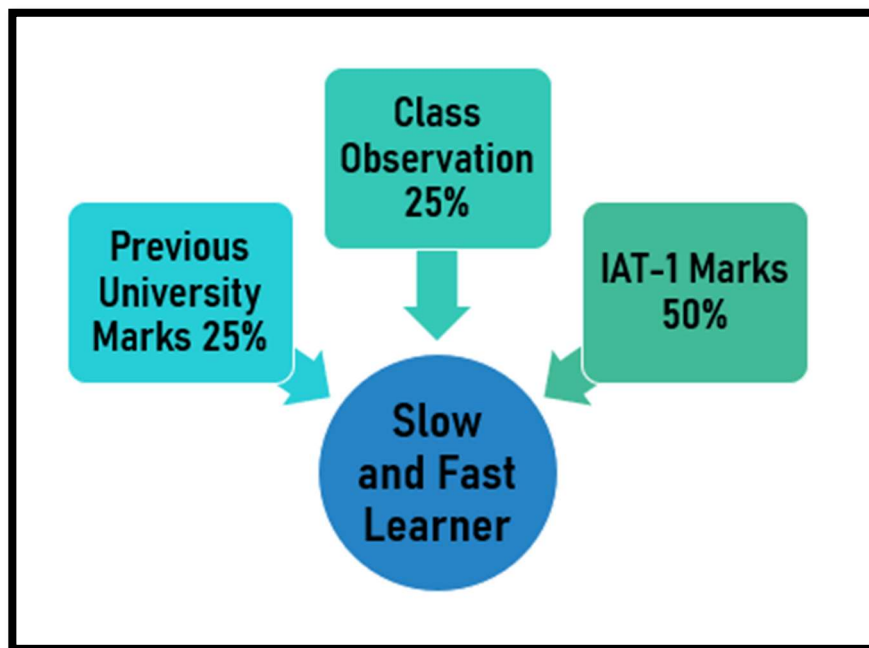
Figure 7.3 Process to Identify the Slow and Fast Learners

- **Sharing University Marks:** Class teachers share the marks students received in university exams with the subject teachers for the same class.

- **Calculating Percentage:** Subject teachers convert the university marks into a percentage (out of 100) for their specific subject.

- **Slow and Advance Learner Identification:** Subject teachers update a "Slow and Advance Learner Identification Sheet" based on these converted marks. This sheet likely helps identify students who may need extra support or those who are excelling.

- **Updating After IAT-1:** "IAT-1" refers to the first internal assessment test within the semester/term. After this test, subject teachers again update the Slow and Advance Learner Identification Sheet.

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🞧 **Scaling Students (1-10):** Teachers assign a separate 1-10 score based on various factors including:

- <u>Attendance:</u> How often the student attends class.
- <u>Class Participation:</u> Their level of participation through question-answer responses.
- <u>Practical Performance:</u> This could be lab work, project work, or other practical assessments specific to the subject.
- <u>Overall Academic Behavior:</u> This could encompass factors like completing homework, following school rules, and taking initiative in learning.

Advance Learner: Assessment percentage is Greater Than or Equal to 70 %

Slow Learner: Assessment percentage is Less Than or Equal to 40 %

(Note: Percentage can be changed with justification by Subject Teacher)

7.3 <u>Activities to support academically weak learner:</u>

1. **Weekly Timetable Adjustments:**

- **Problem-solving/Revision/Extra Sessions:** The recommendation suggests adding an extra hour each week to the timetable. This time can be used for:

  o <u>Problem-solving sessions:</u> Focused practice on applying learned concepts through exercises and challenges.

  o <u>Revision sessions:</u> Dedicated time for students to review past material and solidify their understanding.

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o <u>Extra sessions:</u> Additional classes for specific topics that may require more explanation or practice.

2. Support for Direct Second-Year (DSE) Students:

- <u>Catch-up classes and practical sessions:</u> These sessions are designed to help DSE students (possibly transfer students or those who missed content previously) complete the regular curriculum. They might cover missed material, provide additional practice, or offer opportunities to fulfill practical course requirements.

3. Personalized Learning:

- <u>Personal attention by subject teachers:</u> This emphasizes the importance of teachers providing individual support to students who may need extra guidance or clarification.

4. Additional Learning Resources:

- <u>Assignments and solving University question papers:</u> Regular assignments and practice solving past university exam papers can help students develop their problem-solving skills, identify areas needing improvement, and get familiar with exam formats.

- <u>Question bank:</u> A collection of practice questions and problems covering various topics can be a valuable resource for students to test their understanding and prepare for exams.

5. Student Support Services:

- <u>Counselling - special hints and techniques:</u> This suggests providing access to counselors who can offer students guidance on study skills, exam anxiety management, time management, and potentially share effective learning strategies.

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7.4 Activities to support academically advanced learner:

- Flip Lecture
- Minor Project
- Conduction of Seminar for Juniors
- Encouragement for Paper Writing
- Beyond Syllabus Questions assignments
- Difficult Programming Challenges
- Advanced assignments or tasks should be assigned to advanced learners
- Encouragement to complete NPTEL/Advanced courses
- Encouragement Participation in Seminars/Conferences/Technical Events
- Assignment based on Model making/building

7.5 Process for Continuous Assessment in the laboratory:

Figure below show the continuous assessment process in the laboratory.
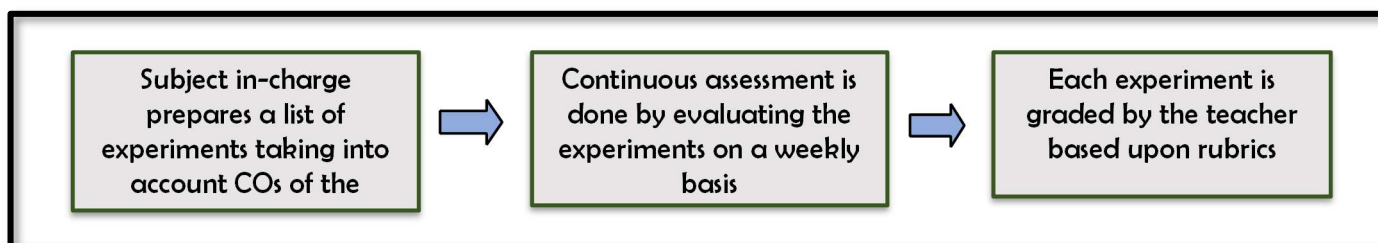
Figure 7.4 The Continuous Assessment Process in the

Laboratory

- Subject teacher must follow the rubrics designed by the department for the Laboratory evaluation.

Experiment evaluation is carried out using following rubrics:

- Knowledge
- Performance
- Content & Neatness of Document
- Punctuality & Submission of time.

7.6 Process for Improving Quality Assignments and its relevance to COs:

- Give assignments to the students as per the scheme of the syllabus of University of Mumbai.
- Prepare assignment questions using Bloom's Taxonomy in line with course outcomes.
- Evaluate assignments as per rubrics.

Assignment evaluation is carried out using following rubrics:

- Knowledge
- Content
- Neatness &Timeline

7.7 Process to conduct student feedback on teaching learning process and action taken:

- Students give feedback for every faculty.
- Feedback is taken twice in a semester.
- This feedback is anonymous and is collected centrally.
- Director and Principal shall analyse the feedback and counsel the faculty on one-on-one basis.

7.8 Process for Improving Quality of IAT Question paper:

University of Mumbai provides guidelines through the syllabus about how each course has to be conducted. It outlines the number of internal assessment tests, syllabus covered in each test, the minimum number of assignments, lab experiments, the course objectives and course outcomes are also mentioned for each subject.

- **Two internal exams:** The first exam covers the initial 40% of the syllabus, and the second covers the next 40%.

- **University considers the average:** The final internal assessment grade is the average score of these two exams.

- **Fast turnaround on results:** Exams are graded and results are declared within a week.

- **Transparency in grading:** Marking schemes are used to ensure fair evaluation, and students can address concerns by requesting to see their answer sheets.

- **Preserving Question papers:** A copy of each question paper must be submitted to the examination in-charge.

The process for IAT question paper setting in order to improve its quality is as shown in Figure 7.5. As per the academic calendar the exam co-ordinator prepares IAT time-table. Referring the COs defined for each course and blooms taxonomy levels, faculty prepares the question paper. The question paper is then checked by subject expert group (SEG). Depending on the modifications/suggestions of SEG, final question paper is submitted to exam co-ordinator.
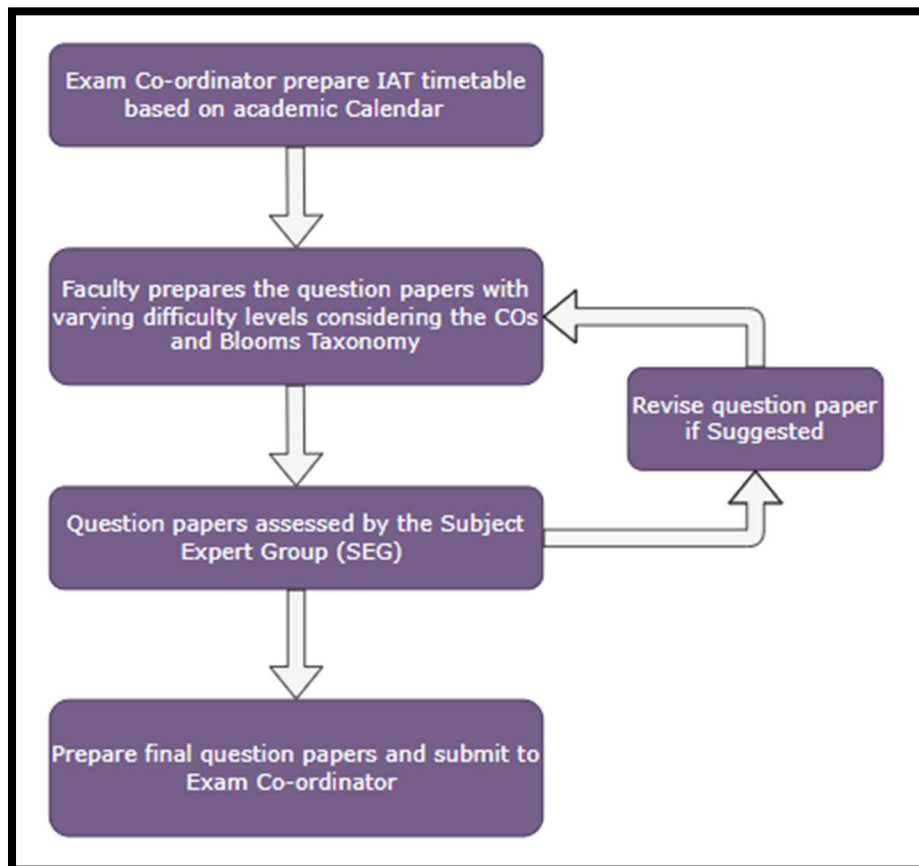
Figure 7.5 The Process for IAT Question Paper

Setting

Process of identification and allocation of Final year projects:

The following project policy has been developed by the Department of Information Technology. Engineering students are required to take up project work at different semesters during their course of study. It is also necessary that they must focus on their studies and pay attention to all their practical sessions, appreciate and apply the knowledge learnt from such practical sessions into their projects and make it successful. The important activities to be addressed while pursuing the projects are as shown in Figure 7.6:
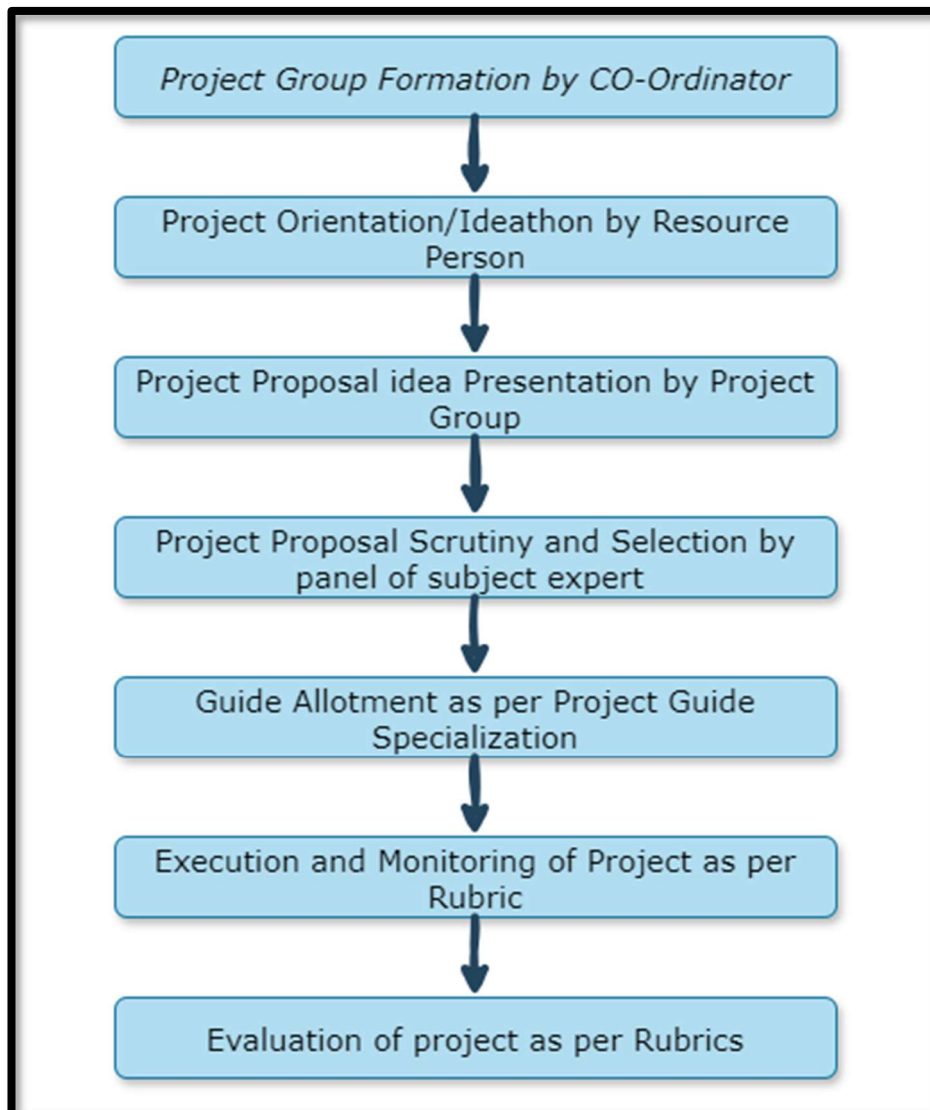
Figure 7.6 The Important Activities to be Addressed

while Pursuing the Projects

Department keeps a proper assessment record of the progress of the project and at the end of the semester it is assessed for awarding term work marks. The term work is examined by approved internal faculty appointed in the department as per their area of specialization.

➢ **Formation of Project Groups**

- The students are notified to form Project groups in the first week of the semester

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VI.

- In order to ensure the participation of each student, the project size shall preferably be 2 and not more than 3 students.

- Formation of project groups shall be done such that each group has representation of students with varying/similar academic merit as well as mixed domain expertise.

➢ **Project Orientation / Ideathon by Resource Person**

- Final year project process begins in the 3rd year, Semester 6 (SEM VI).
- Project Coordinator conducts a Project Orientation for students.
- Orientation explains the Final Year Project Process.
- Coordinator highlights current research topics.
- Orientation sets expectations for project quality.
- Provides students with project guidelines.
- Informs students of recent trends in different domains.
- Creates a platform to share new project ideas.

➢ **Selection of a project**

- The ideas are presented to the faculties in a project review presentation.
- After the careful examination of the idea presented by the student/team, projects are finalized and supervisors are allocated to the students by the project coordinator.
- Students discuss selected project ideas with their allocated supervisor.
- Finally, the list of allocated projects is displayed.

➢ **Project Allotment**

Project Guides is assigned to each project group based on the area of interest of the faculty. Each Project Guide shall be allotted Maximum of 2-3 groups. Students shall meet their respective guide frequently during the project, on a weekly basis. As per University of

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Mumbai scheme of syllabus, duration and time of project allotted in the timetable.

➢ **Assessment of a project**

● Continuous Project Assessment and Evaluation shall be carried out based on the guidelines given by the University.

● The project assessment for term work is done at least two times at department level by giving presentations to panel members appointed by the Head of the department of respective Programme along with the Project Co-ordinator.

● The final assessment marks of viva voce examination conducted/ held by the University panel.

7.10 Process for monitoring and evaluation of project:

Continuous Project Assessment and Evaluation is done as per the guidelines from IQAC, and the detailed process is shown in Figure 7.7:
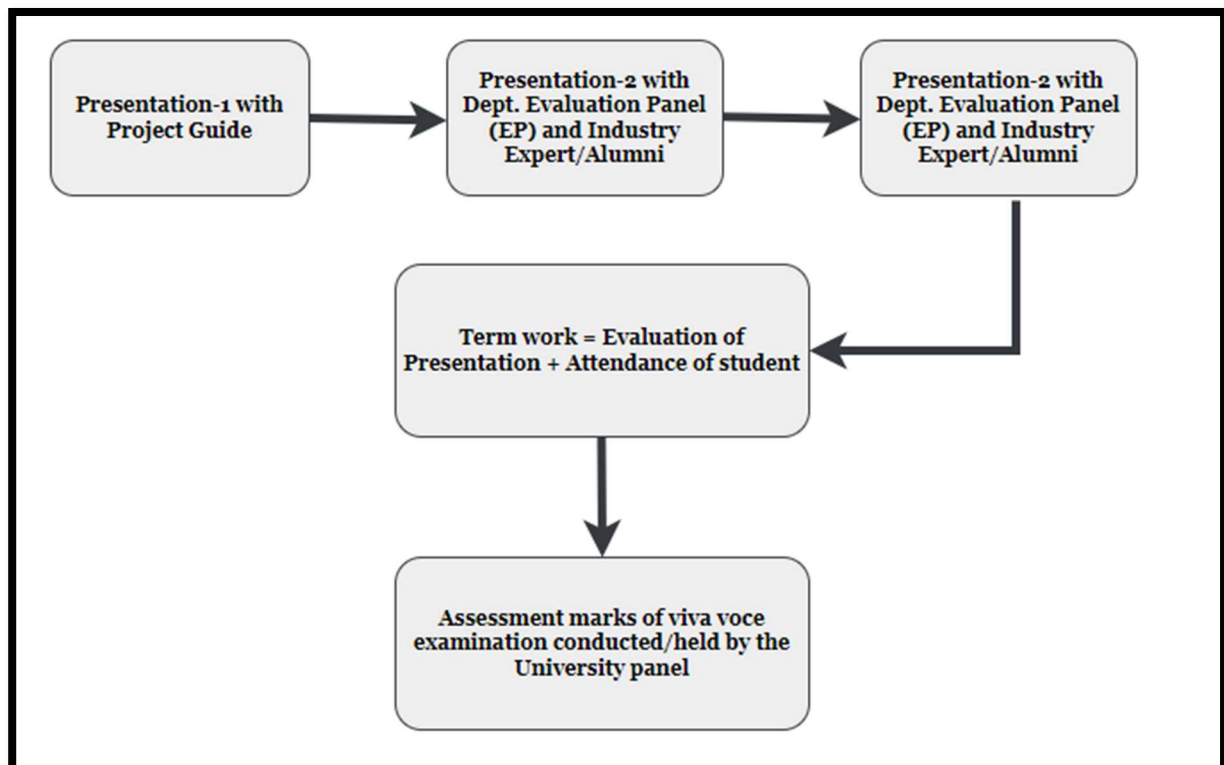
Figure 7.7 The Process of Project Assessment and Evaluation

Project Evaluation Rubrics:

Rubrics for Internal Assessment

Two presentations are conducted during the semester and evaluated based on following rubrics.

- Project Selection (Innovation & Creativity)
- Literature Survey
- Teamwork and Presentation
- Design / Methodology
- Content Formatting & Organization

Rubrics for Term Work

- Quality of the Problem
- Team Work
- Breadth and Depth of Literature Survey
- Theoretical Analysis of Proposed Problem
- Design / Methodology
- Presentation
- Report Writing

7.11 Process to assess individual and team performance:

Various rubrics are developed to assess individual and team performance of students, rubrics for internal assessment and term work are shown in the previous section and rubrics for oral are shown below.

Rubrics of Oral

- Problem Selection, Innovation & Applicability
- Team Contribution, Timeline & Attendance
- Depth of Review of Literature, Analysis and Design, Survey Paper Writing and Presentation
- Synopsis Content & Formatting
- PPT Formatting and Presentation
- Team Contribution, Timeline & Attendance
- Completeness of the project and skill level of the student
- Project Report Content & Formatting
- Participation in Project Competition, Technical Paper Writing and Presentation
- Project Presentation, PPT Formatting and Demonstration

7.12 Process to identify the Quality of Completed projects:

Following tables show the best and average projects selected during the assessment period.

Best Project Evaluation Criteria:

- Internal Evaluation (Marks)
- External Evaluation (Marks)
- Project Guide Observation

The projects scoring **more than 90% marks** are categorized as the **best** projects whereas those scoring between 70% - 90% marks are average projects.

8 • **CO Assessment/Attainment Process**

The key aspects in Outcome-Based Education (OBE) are the assessment of course outcomes. At the initial stage of OBE implementation, the Course Outcomes (COs) for each course are defined based on the Program Outcome (POs) and other requirements.

- At the beginning of each course subject teacher has to finalize the target levels and CO/LO attainment target based on the policy decided by the department.

- At the end of each course, the COs need to be assessed and evaluated, to check whether it has been attained or not.
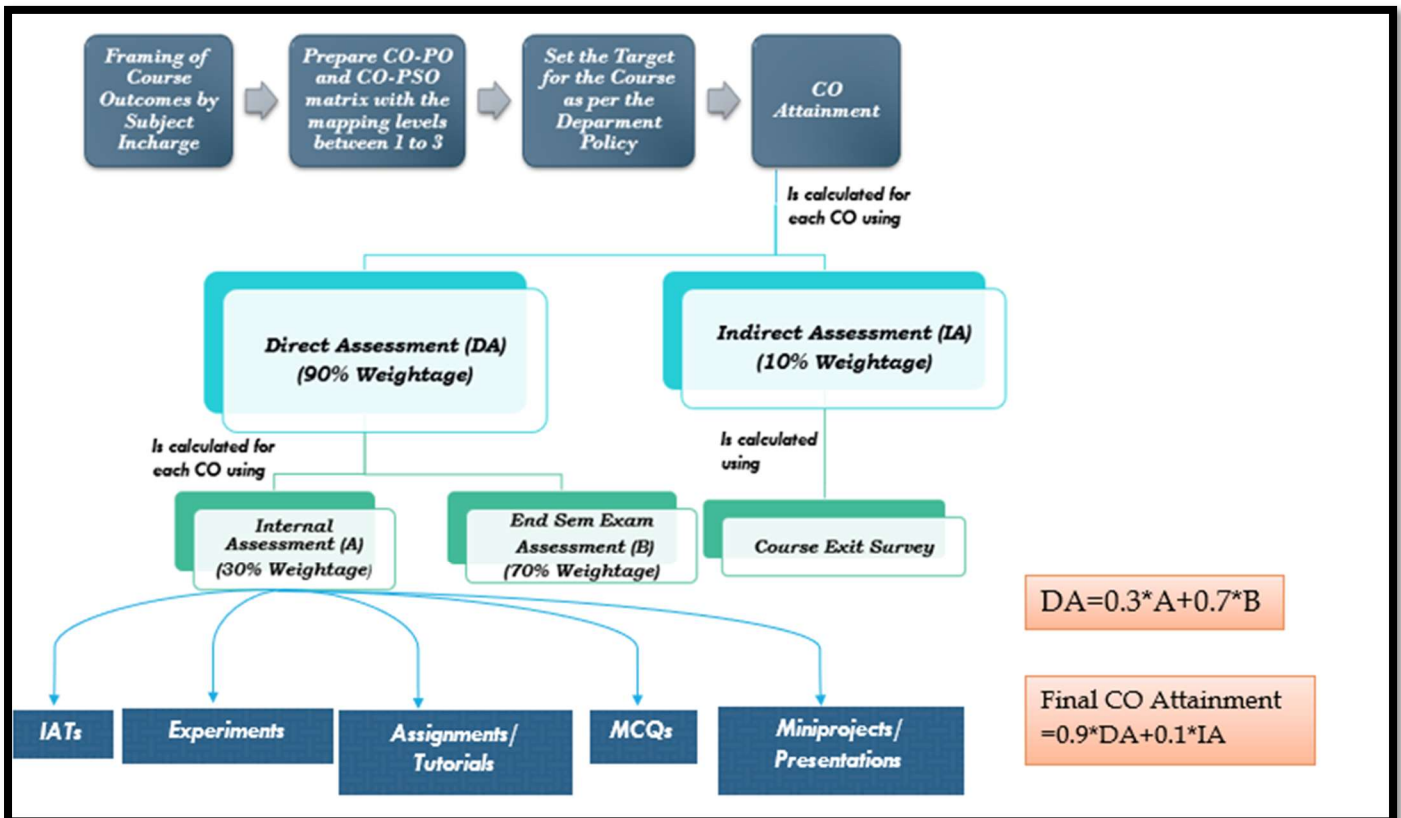
Figure 8.1 CO Assessment/Attainment Process

- Assessment of one or more processes should be carried out by the department, that identifies, collect, and prepares the data to evaluate the achievement of Program Educational Objectives and Program Outcomes.

- Every Semester, before the commencement of the teaching process, faculty should prepare the COs of their respective subject. The Course Outcomes should be written by the respective faculty member using action verbs of learning levels as suggested by Bloom's Taxonomy. Each faculty must announce about all COs of the course during their introductory lecture. COs shall be mapped to the POs and PSOs on a scale of 1-to-3, where 3 stands for maximum correlation and 1 for minimum or lowest correlation.

- The faculty are instructed to use the department policy of evaluation and the rubrics to be followed for CO attainment calculation. The process of attainment of COs, POs, and PSOs starts from writing appropriate COs for each course, followed by calculating attainments of COs, mapping the COs with the POs, and PSOs and finally calculating attainment of POs by considering all the courses of all the semesters of an academic year of the program.

- Attainment of the COs / LOs can be measured directly and indirectly.

Course Outcome (CO) / Lab Outcomes (LO) attainment calculations are as followed
$\rightarrow$ Direct method (90% weightage)
$\rightarrow$ Indirect method (10% weightage)

Direct method (90% weightage)

↵ The Direct methods is calculated by using **Internal Assessment Test (IAT)** (30% weightage) +**End Semester Examination (ESE)** (70% weightage)
↵ Direct CO **assessment tools** used to measure the **Internal Assessment (**30% weightage) such as Internal Assessment Test – IAT I & II, Assignments/Tutorials,

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Quizzes (MCQ), Performance during experiments, Mini projects, major projects and mock orals.

↵ Direct CO **assessment tools** used to measure the External Assessment (70% weightage) such as End Semester Examination **(ESE).**

Final examination conducted by the University of Mumbai of all theory and laboratory performances in the subjects.

Indirect method (10% weightage)

Indirect assessment of Course Outcome is carried out by - Course Exit Survey, using students' feedback towards his understanding addressed by the COs.

Final Course Outcome(CO) Attainment Summary=

Direct assessment method (90% weightage)

+Indirect assessment method (10% weightage)

Based on the CO attainment levels set, the final attainment values are obtained in the range of 1,2, & 3.

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9 • POs/PSOs Assessment/Attainment Process

Attainment of each of the POs and PSOs is measured by considering

Direct Assessment (80% weightage) and Indirect Assessment (20% weightage)
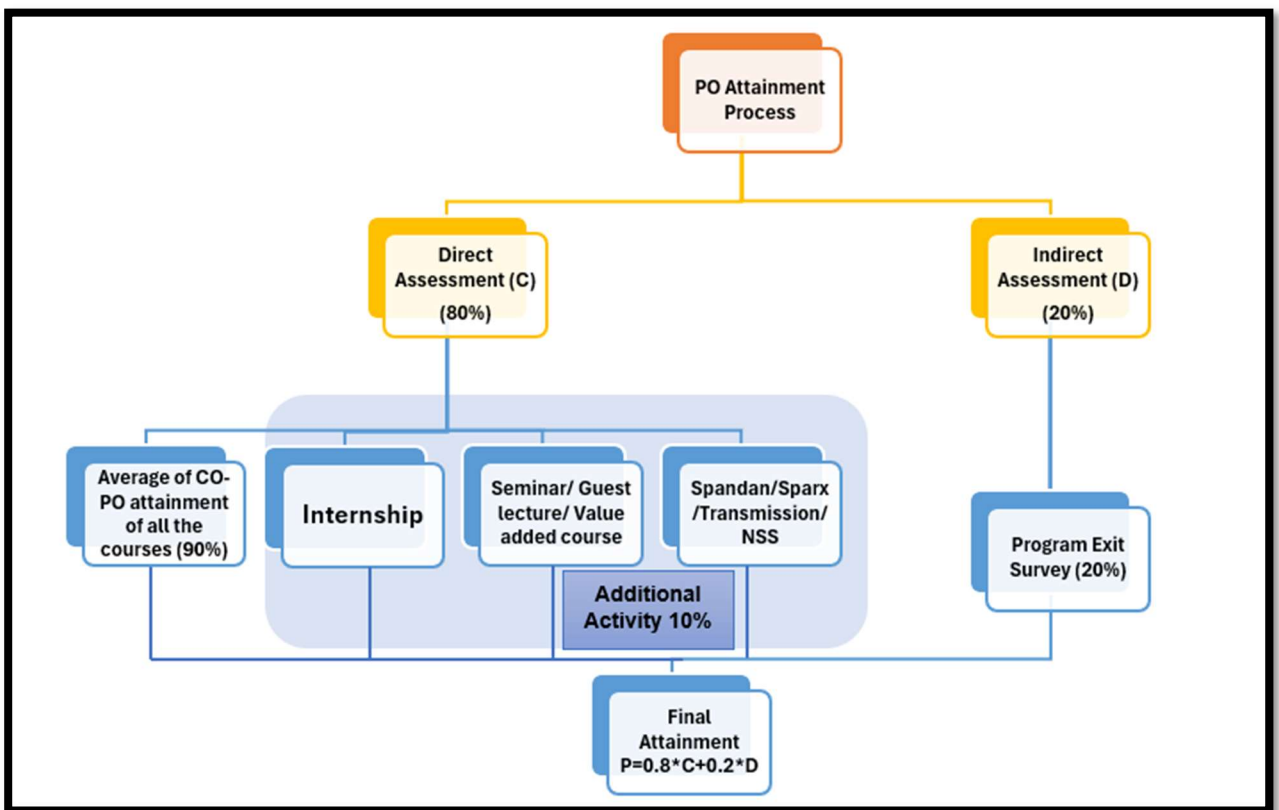
Figure 9.1 POs/PSOs Assessment/Attainment Process

Process begins with the consideration of target of each PO/PSO decided by the department. The PO/PSO's assessment/attainment process is shown in Figure 9.1.

Direct Assessment is calculated by considering average of CO-PO attainment of all courses as 90% and 10% is considered for additional activities which includes Internship completed by the students, Seminar/ Guest lectures and value-added courses organized for students and

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student participation in cultural & technical events such as SPANDAN, SPARX, TRANSMISSION, CSX. Also, student participation in NSS activities are considered.

Attainment of Course Outcome is directly considered in the **PO attainment** reference cell where the CO-PO mapping was done earlier

PO attainment = Value of PO mapping * Value of CO attainment / highest value of PO mapping (=3)

Attainment of Course Outcome is directly considered in the **PSO attainment** reference cell where the CO-PSO mapping was done earlier.

If PO attainment is achieved for particular PO, then target value is incremented by 5% for next academic year. If PO attainment is not achieved then same target value is continued for next academic year

PSO attainment = Value of PSO mapping * Value of CO attainment / highest value of PSO mapping (=3)

Direct Assessment Tool: **(80% weightage)**

- Internal Assessment Test
- Lab Internal Assessment Marks
- Assignments (Internal Assessment
- Semester Examination -Theory (External Assessment)
- Semester Examination-Laboratory (External Assessment)
- Semester Project (External Assessment)
- Guest Lectures/ Seminar / Value Added courses
- Internship
- Extra-curricular activities

Indirect Assessment: (20% weightage)

Program Exit Survey is considered as a tool for indirect assessment. A Program exit survey is collected from final year students.

10 • **Quality Initiatives to sustain / improve COs Attainment**

Each subject teacher should identify the corrective measures to sustain/improve COs based on the CO attainment after IAT1 and IAT2 and same will be implemented in next academic year.

11 • **Quality Initiatives to sustain / improve POs/PSOs Attainment**

- Each subject teacher should identify the corrective measures to sustain/improve POs/PSOs based on the POs/PSOs attainment at the end of the semester and same will be implemented in next academic year.

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12 • Case Study of Outcome Based Education (OBE)

Sample CO and CO-PO & CO-PSO mapping:

TE-IT-TEITC502-COMPUTER NETWORK SECURITY(AY-2023 -2024)	
CO-ID	**CO Statements**
TEITC502.1	Summarize the fundamentals concepts of computer security and network security.
TEITC502.2	Enumerate the basic cryptographic techniques using classical and block encryption methods.
TEITC502.3	Characterize the system security malicious software.
TEITC502.5	Generalize the need of network management security and illustrate the need for NAC.
TEITC502.6	Describe the function of an IDS and firewall for the system security.

CO Assessment Tools:

CO-ID	CO Statements	Tool 1		Tool 2	
TEITC502.1	Summarize the fundamentals concepts of computer security and network security.	IAT-1	75%	Quiz-1	25%
TEITC502.2	Enumerate the basic cryptographic techniques using classical and block encryption methods.	IAT-1	75%	Quiz-2	25%
TEITC502.3	Characterize the system security malicious software.	IAT-1	75%	Quiz-3	25%
TEITC502.4	Elaborate the Network, Transport and Application layer security.	IAT-2	75%	Quiz-4	25%
TEITC502.5	Generalize the need of network management security and illustrate the need for NAC.	IAT-2	75%	Quiz-5	25%
TEITC502.6	Describe the function of an IDS and firewall for the system security.	IAT-2	75%	Quiz-6	25%

Goal Setting

AY	Theory		
	IAT, Assignments, Presentations, MCQs, and End-Semester Examinations		
	Level	Students	Marks
AY 23-24	1	60%	
	2	65%	55%
	3	70%	

CO Attainment:

Computer Network Security CO Attainment Summary											
CO ID	Internal Assessment (Direct Method)				External Assessment (Direct Method)		Direct Attainment level	Indirect Assessment		Final Attainment Level (Direct 90% + Indirect 10%)	CO Attainment
	Direct Assessment		Internal Attain-ment %	Internal Attain-ment Level	External Attainment %	External Attainment Level		Course Exit Survey	Indirect Attainment Level		
	Tool1	Tool2									
	90% Weightage							10% Weightage			
	30% Weightage				70% Weightage						
TEITC502.1	IAT 1(75%)	MCQ-1(25%)	93.44	3	72.13	3	3	88.15	3	3	Attained
	93.44	93.44									
TEITC502.2	IAT 1(75%)	MCQ-2(25%)	72.13	3	72.13	3	3	89.63	3	3	Attained
	54.1	90.16									
TEITC502.3	IAT 1(75%)	MCQ-3(25%)	84.43	3	72.13	3	3	88.15	3	3	Attained
	77.05	91.8									
TEITC502.4	IAT 2(75%)	MCQ-4(25%)	81.15	3	72.13	3	3	84.44	3	3	Attained
	75.41	86.89									
TEITC502.5	IAT 2(75%)	MCQ-5(25%)	77.87	3	72.13	3	3	85.93	3	3	Attained
	73.77	81.97									
TEITC502.6	IAT 2(75%)	MCQ-6(25%)	92.62	3	72.13	3	3	88.89	3	3	Attained
	93.44	91.8									

Corrective Measures to sustain/improve CO attainment:

- ✓ Additional case study topics on real world problems
- ✓ Encourage students to conduct a survey of available literatures and present review papers in technical competitions
- ✓ Simulate laboratory problems for students to practice in labs to reinforce basic concepts of engineering & science.
- ✓ Encourage students to complete MOOC courses on this subject.

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CO-PO-PSO Attainment:

A.Y 2023 - 2024														
TE-IT-TEITC502-Computer Network Security ITC502 (CNS)														
CO-PO and CO-PSO Correlation Matrix														
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
TEITC502.1	3	2	1			3		2	3	3		2	2	3
TEITC502.2	3	3	1	1		3		2	3	3		2	3	3
TEITC502.3	2	2	1	1		3		2	3	3		2	2	2
TEITC502.4	2	3	1	2		3		2	3	3		2	2	2
TEITC502.5	2	3	1	2		3		2	3	3		2	3	3
TEITC502.6	2	3	1	1		3		2	3	3		2	3	3
Average CO-PO Mapping	2.3	2.7	1.0	1.4		3.0		2.0	3.0	3.0		2.0	2.5	2.7
PO-ATTAINMENT	2.3	2.7	1.0	1.4		3.0		2.0	3.0	3.0		2.0	2.5	2.7

CO ATTAINMENT:

COS	CO-ATTAINMENT
TEITC502.1	3
TEITC502.2	3
TEITC502.3	3
TEITC502.4	3
TEITC502.5	3
TEITC502.6	3

PO Attainment - PO Target Correlation														
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
PO- Target	2.25	2.25	2.25	2.25	2.25	1.95	1.95	1.65	1.95	1.95	2.25	1.8	2.1	2.1
PO-ATTAINMENT TEITC502	2.3	2.7	1.0	1.4		3.0		2.0	3.0	3.0		2.0	2.5	2.7

Corrective Measures to sustain/improve PO, PSO attainment:

- ✓ Additional case study topics on real world problems
- ✓ Encourage students to conduct a survey of available literatures and present review papers in technical competitions
- ✓ Simulate laboratory problems for students to practice in labs to reinforce basic concepts of engineering & science.
- ✓ Encourage students to complete MOOC courses on this subject.
- ✓ Introduction of contemporary topics as topics beyond syllabus to keep students' knowledge up -to-date.
- ✓ Encourage students to participate in co-curricular and extra-curricular activities.

13 • Annexure-1

PROGRAM OUTCOMES

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

PO3: 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.

PO4: 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.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: 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.

PO7: 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.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: 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.

PO11: 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.

PO12: 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.

14 • Annexure-2

Electronics and Telecommunication Engineering

VISION AND MISSION

Our Vision

✓ To nurture the joy of excellence in the world of Electronics and Telecommunication Engineering.

Our Mission

✓ To equip students with strong foundations to enable them for higher studies and lifelong learning.

✓ To educate the students for the state of art technologies to meet challenges of Electronics and Telecommunication field.

✓ To collaborate and associate with highly reputed institutes from India and Abroad to enhance professional excellence.

✓ To impart total quality education for developing innovative, entrepreneurial and ethical professionals, fit for globally competitive environment.

✓ To strengthen the soft skills and logical thinking of students through co-curricular and extracurricular activities.

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Program Educational Objective

PEOs of the Electronics and Telecommunication Engineering program are as following:

- ✓ Preparation: Graduates shall have a strong foundation in mathematical, scientific, and engineering fundamentals to succeed in their careers.

- ✓ Core Competence: Graduates shall cope with the need for rapidly growing technology with core knowledge in Electronics and Telecommunication Engineering.

- ✓ Breadth: Graduates shall upskill their knowledge and skills across various disciplines and find solutions to improve the quality of life.

- ✓ Professionalism: Graduates shall have soft skills, ethical values, and the ability to work in a team in their chosen field.

- ✓ Learning Environment: Graduates will be competent in self-learning to contribute to emerging technologies.

Program Specific Outcomes

PSOs of the Electronics and Telecommunication Engineering program are as following:

- ✓ To combine fundamentals of electronics, signal processing, communication, control system along with analysis and programming skills to solve complex problems in the field of Electronics and Telecommunication Engineering.

- ✓ To design, develop, test and demonstrate wired and wireless electronics and embedded system with innovative solutions and consideration of real-time constraints.

Information Technology

VISION AND MISSION

Our Vision

✓ To nurture the joy of excellence in the world of Information Technology.

Our Mission

✓ To develop the critical thinking ability of students by promoting interactive learning.

✓ To bridge the gap between industry and institute and give students the kind of exposure to the industrial requirements in current trends of developing technology.

✓ To promote learning and research methods and make them excel in the field of their study by becoming responsible while dealing with social concerns.

✓ To encourage students to pursue higher studies and provide them awareness on various career opportunities that are available.

Program Educational Objective

After 3-5 years of graduation, Information Technology Engineering Graduates shall be:

- ✓ Employed as IT professionals, and shall engage themselves in learning, understanding, and applying newly developed ideas and technologies as their field of study evolves.
- ✓ Competent to use the learnt knowledge successfully in the diversified sectors of industry, academia, research and work effectively in a multidisciplinary environment.
- ✓ Aware of professional ethics and create a sense of social responsibility in building the nation/society.

Program Specific Outcomes

PSOs of the Information Technology program are as following:

- ✓ Demonstrate the ability to analyze and visualize the business domain and formulate appropriate information technology solutions.

- ✓ Apply various technologies like Intelligent Systems, Data Mining, IOT, Cloud and Analytics, Computer and Network Security etc. for innovative solutions to real time problems.

Computer Engineering

VISION AND MISSION

Our Vision

✓ To nurture the joy of excellence in the world of Computer Engineering.

Our Mission

✓ To provide students the knowledge of computer engineering with related technical skills to solve various computer engineering problems and to have industry interaction.

✓ To motivate the students to acquire additional soft skills to sharpen their technical and professional skills that make them employable.

✓ To nurture social and professional ethics in our undergraduates and encourage them to have lifelong learning.

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Program Educational Objective

PEOs of the Computer Engineering program are as following:

- ✓ Graduates will have the required knowledge of computer engineering, to design and develop systems that can cater to a multi-disciplinary environment.
- ✓ Graduates will be able to apply the art of self-learning to use the modern tools in solving computer engineering problems.
- ✓ Graduates will be prepared in the field of computer engineering to have lifelong-learning in the global and ethic context.
- ✓ Graduates will be able to inculcate professional and ethical attitude with good leadership qualities and have commitment to social responsibilities in their thought process.

Program Specific Outcomes

PSOs of the Computer Engineering program are as following:

- ✓ The ability to understand, analyze and apply knowledge to address computing problems.

- ✓ The ability to design and implement software solutions to meet the end users requirements.

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