SREEPATHY INSTITUTE OF MANAGEMENT AND TECHNOLOGY

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ACADEMIC HANDBOOK ON OUTCOME BASED EDUCATION

Contents

PREFACE

Institutions need to decide on a short-term goal as well as a long-term goal in terms of students' learning outcomes, personal growth, skill development, and the institution's overall performance. This can be done by following the Outcome Based Education (OBE). OBE ensures that the higher aim of the entire institution as formulated in the Vision statement can be achieved within a specified time.

This manual is a reference to help faculty members and stakeholders to understand the Outcome Based Education (OBE) system implemented at Sreepathy Institute of Management and Technology (SIMAT).

The manual provides a detailed description of implementation of Outcome Based Education 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 after their graduation.

OUR VISION

"Striving for excellence in generation and dissemination of knowledge"

OUR MISSION

- To mould engineers of tomorrow, who are capable of addressing the problems of the nation and the world, by imparting technical education at par with international standards
- To instil a desire in students for research, innovation, invention and entrepreneurship
- To strive for creative partnership between the industry and the institute
- To impart the values of environment awareness, professional ethics, societal commitment, life skills and a desire for lifelong learning

CORE VALUES

- **Honesty:** The Institute will adhere to the highest standards of ethics and will maintain an environment of academic freedom and honesty.
- **Quality:** The Institute is committed to quality in all spheres of its activities, and will work towards continuous improvement.
- **Accountability:** The Institute is conscious that it is accountable to the society and to all its immediate stakeholders including students, staff, faculty, alumni and industry.
- **Transparency:** The Institute will function according to defined procedures and rules, which will be informed to all stakeholders. The Institute will make public all important information related to its functioning.
- **Compassion:** The Institute is aware of the conditions of the weaker sections of our society and our endeavor will be towards the solution of their problems through the research and education programs of the Institute.
- **Respect:** Each person in SIMAT is to be treated equitably with respect and dignity in all situations.
- **Sustainability:** The Institute is committed to minimizing our impact on the environment for the benefit of a more sustainable future.

1. PRIMARY DEFINITIONS AND NOMENCLATURE

Vision: A vision statement is a document that states the current and future objectives of a college/department. The vision statement is intended as a guide to help the college/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 after the completion 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. This is also known as CO-PO justification sheet.

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

End Semester Examinations (ESE): ESE 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.

2. OUTCOME BASED EDUCATION (OBE)

In response to the need for standardization of education systems and processes, many higher education institutions shifted attention and efforts toward implementing the Outcome-Based Education (OBE) system. 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. Indian Engineers can compete with their global counterparts. 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.

OBE is a process that involves the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of higher order learning and mastery rather than the accumulation of course credits.
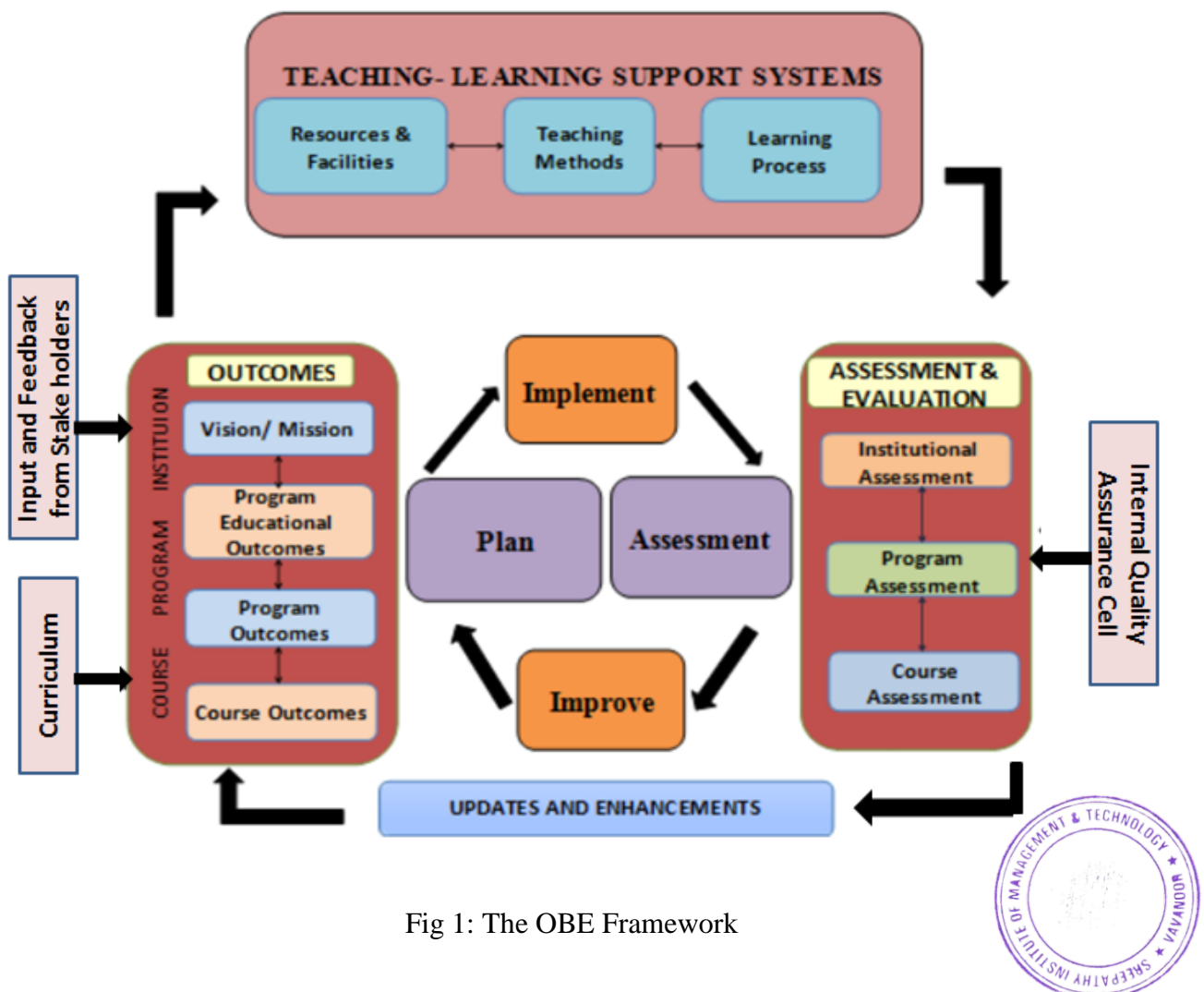

Fig 1: The OBE Framework

The OBE learning process can be stated into four steps:

a) Plan (Syllabus Writing/Review) — The Course Learning Outcomes are aligned with the Vision, PEO and Student Outcomes. The syllabi coverage reflects strategies (learning plan) for achieving the outcomes, as well as for measuring the outcomes (assessment).

b) Implement (Course Delivery)- Carry out the learning plan and strategies planned for producing the outcomes.

c) Measure/Assess (Assessment) – Carry out the strategies planned for measuring the learning outcomes and objectives. Assess the students and collect this data and analyze it to determine the results. (Assessment Phase). This phase is where feedback is obtained.

d) Respond / Improve (Continuous Quality Improvement) – Determine what needs to be changed to make improvements. These changes are the basis of new or revised outcomes and objectives for the next cycle of the process. This process can be looked at on a program or course level.

Summarizing, OBE is student-centered 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 four 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.

2.1 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 have learnt the required skills and content.

2.2 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.

- Lacks emphasis on soft skills needed in jobs e.g. communication skills, interpersonal skills, analytical skills, working attitude etc.

2.3 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.
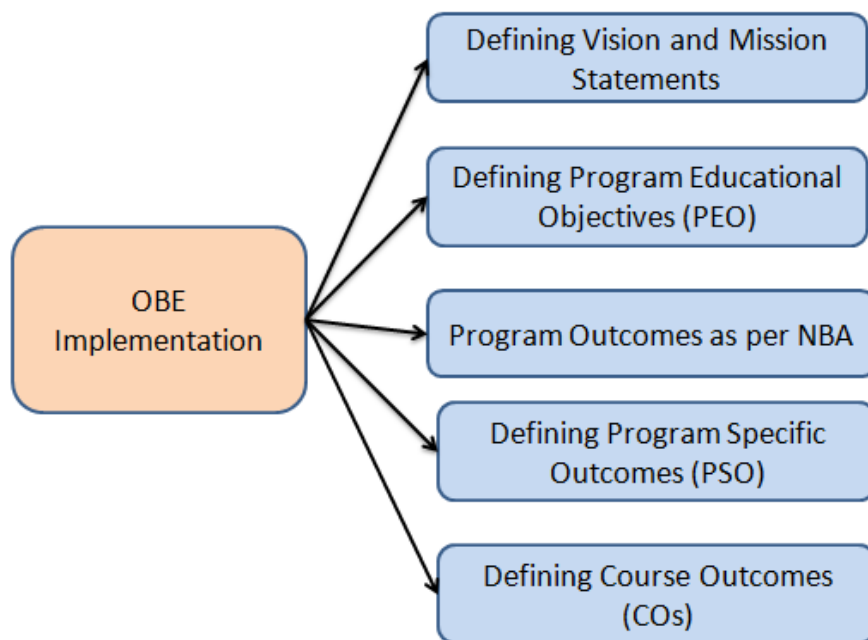
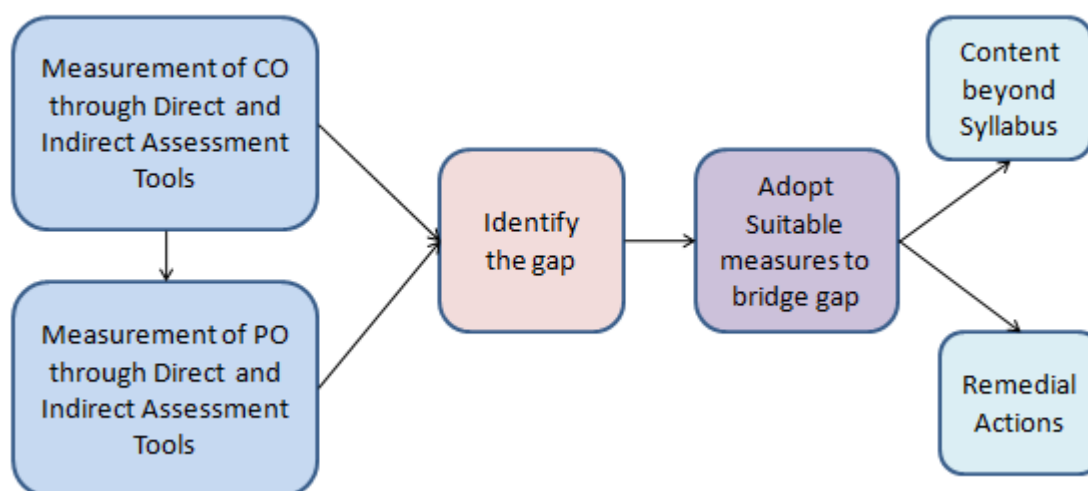## 2.4 OBE Philosophy

Fig 2: OBE Philosophy

Fig 3: Corrective Measures

OBE is implemented as per the following steps:

- Define Vision statements, Mission statements for the Institute and department
- Define Program Educational Objectives
- PO & PSO Statements
- Map courses with Program outcomes at suitable levels
- Define Course Outcomes using action verbs from Bloom's Taxonomy
- Map topics with Course outcomes
- Prepare lecture-wise Course Plan
- Define pedagogical tools for course outcomes delivery
- Define rubrics for Tutorial, Practical, seminar, Mini Project, Final year Project
- Use Learning Management Tool for Assignments, Quizzes, Content beyond syllabus coverage, Tests, Course feedback etc.
- Measure the attainment of each CO through Direct/Indirect assessments
- Track students performance
- Identify Gaps in the Curriculum and adopt suitable measures to bridge the Gap
- Compare CO/PO/PSO attainments and propose remedial actions
- Assess the attainment of Program Educational Objectives

3. PROCESS OF DEFINING VISION AND MISSION OF THE DEPARTMENT

The first step in philosophy of the OBE comprises of defining the Vision and Mission of the institute as well as that of the various departments in the institute. The following steps are followed to establish Vision and Mission of Department.

- The Vision & Mission of the Institute is taken as the basis.

- The department conducts brain-storming sessions with the faculty, students and management on the skill set of students as required by local and global employers, industrial technological advancements, and R & D, and a draft copy of the Vision and Mission of the Department is drafted.

- The views from Professional Bodies, Industry representatives, Department Advisory Board (DAB), College Internal Quality Assurance Committee (IQAC) are collected and incorporated to revise the draft version based on their inputs.

- The accepted views are analyzed and reviewed to check the consistency with the vision and mission of the institute.

- The draft with all the revisions is sent through IQAC to Academic Council which then recommends it to the Governing council for final approval.
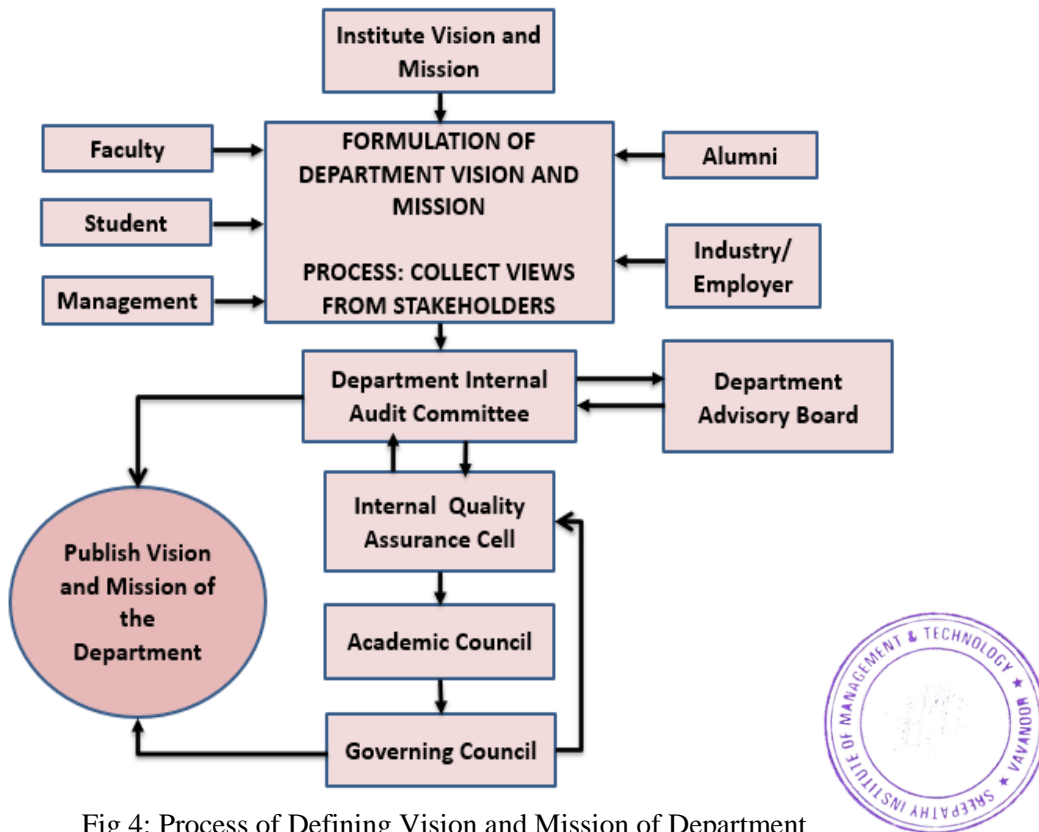

Fig 4: Process of Defining Vision and Mission of Department

4. PROCESS OF DEFINING PEOs AND PSOs OF THE DEPARTMENT

The program educational objectives (PEOs) should fall in line with the Mission statements. The following steps are followed to establish PSOs and PEOs of the Department

- The Program curriculum designed by the University is analyzed by incorporating inputs from members from various academic institutions, R&D organizations and industry and considering the Vision of the department.

- Inputs are obtained from alumni and other stake holders.

- Besides, a skill in demand analysis is carried out periodically at the Academic council and Program Assessment Committee to identify the core areas in the Program domain that are consistent with industry needs.

- PSOs are consolidated by the Department Advisory committee. A list of two to four 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.
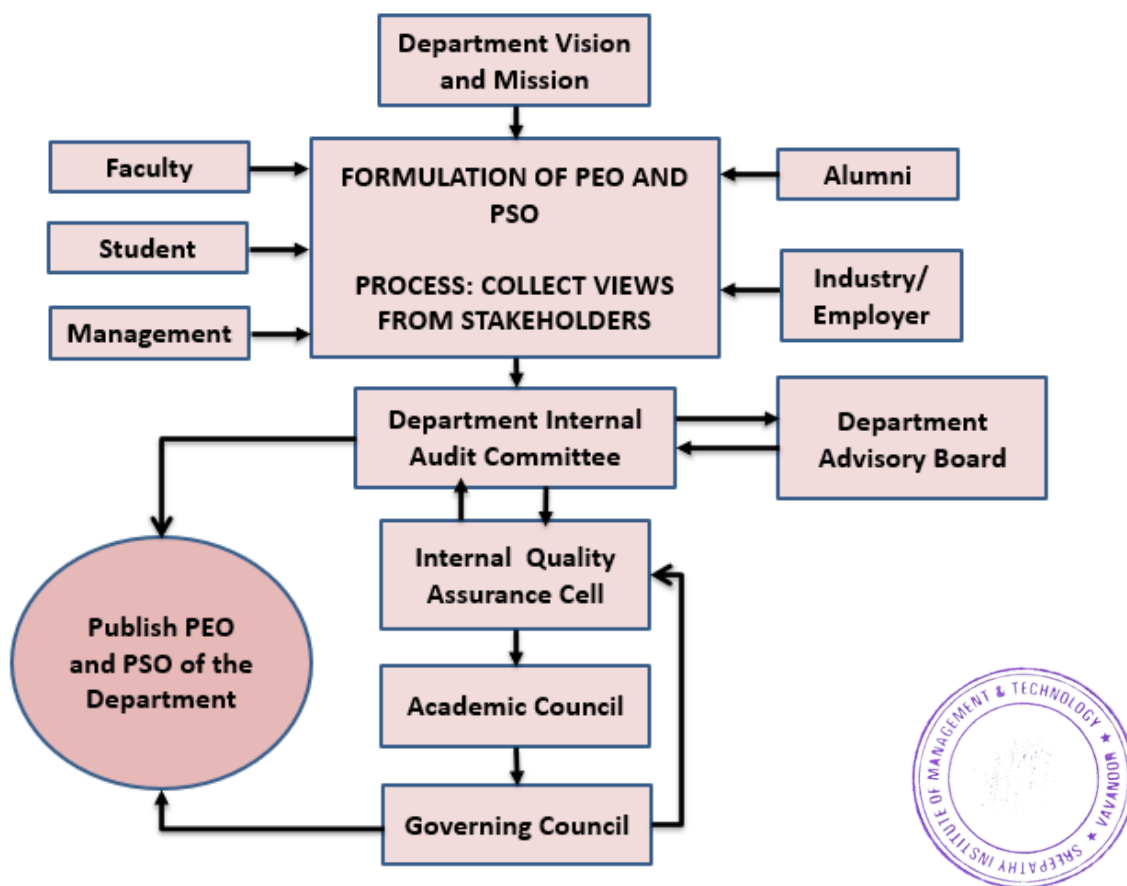

Fig 5: Process of Defining PEO and PSO

5. THE PROGRAM OUTCOMES (POs) DEFINED BY 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 which are in line with the Graduate Attributes as defined by the Washington Accord.

1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and 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.
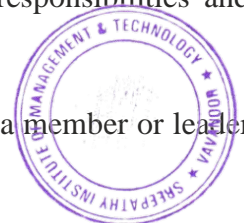
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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

5.1 Program Specific Outcomes (PSOs)

- Program Specific Outcomes are statements that describe what the graduates of a specific engineering program should be able to do.
- PSOs characterize the specificity of the core courses of a program.
- PSOs are defined based on the focus areas and Vision of the Department.
- Generally, two to four Program Specific Outcomes (PSOs) that the graduates of the program will attain should be defined for each department.

6. PUBLICATION AND DISSEMINATION

The Vision, Mission statement of the Institution and Department, PSO statements, PO and PEO statements, CO statement are broadcasted 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
- College Library
- Classrooms
- Seminar Hall
- Curriculum and Syllabi
- Lab Manuals
- Course files
- News Letter
- Department Magazines
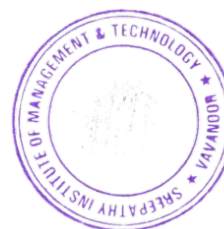
7. COURSE OUTCOME (CO) STATEMENTS

Course Outcome Statements indicate what a student can do after the successful completion of a course. COs are the statements of Knowledge/ Skills/ Attitude that students are expected to know, understand and perform, as a result of learning experiences. Course Outcome remains the base of the hierarchy of outcomes and is the tools that can be used to measure student performance in each course. The CO statements are defined by considering the course content covered in each module of a course. For every course there may be five or six COs. The keywords used to define COs are adapted from Bloom's Taxonomy.

7.1 Rules to develop COs:

The rules to develop CO are SMART.

Fig 6: Rules to Develop CO

S – Specific: Student can state what they should be able to achieve from reading the outcomes.

M – Measurable: Student can be able to recognize when they have achieved through the outcomes.

A – Achievable: It is genuinely possible to complete the outcomes in time and with the resources available.

R – Realistic: Outcomes are appropriate for the student.

T – Time bounded: Outcomes have a time limit for completion.

Step 1: Begin with an Action Verb

Begin with an action verb that denotes the level of learning expected. Terms such as know, understand, learn, appreciate are generally not specific enough to be measurable. Levels of learning and associated verbs are adapted from Bloom's model.

Step 2: Follow with a Statement

The statement should describe the knowledge and abilities to be demonstrated. For example: Students will summarize the main ethical considerations relevant to the field of artificial intelligence
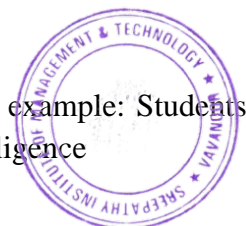
7.2 Action Verbs for Course Outcomes: Blooms Revised Taxonomy

There are six levels of cognitive learning according to the revised version of Bloom's Taxonomy. Each level is conceptually different. The six levels are remembering, understanding, applying, analyzing, evaluating, and creating. Bloom's Taxonomy is frequently used in writing the course outcomes as it provides a readymade structure and list of action verbs. All levels of Bloom's taxonomy of thinking skills can be incorporated into expected learning outcome statements. Recently, Anderson and Krathwohl (2001) adapted Bloom's model to include language that is oriented towards the language used in expected learning outcome statements. A summary of Anderson and Krathwohl's revised version of Bloom's taxonomy of critical thinking is provided in Figure below:
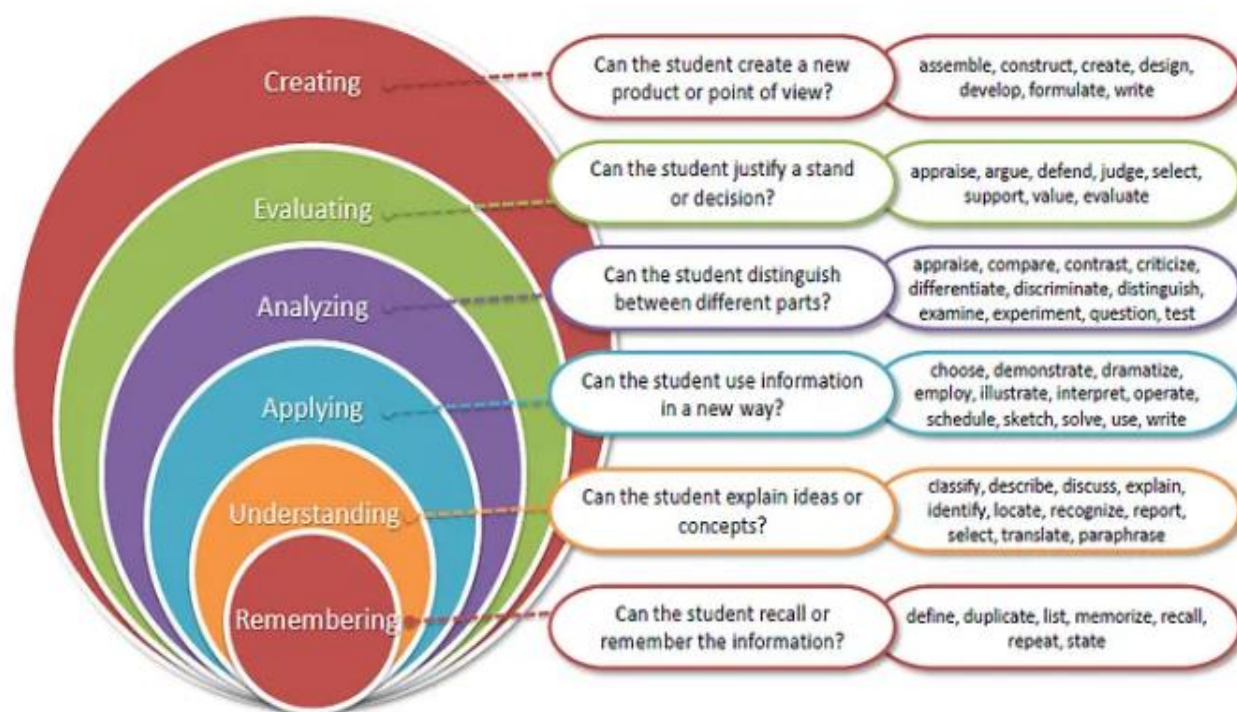

Fig 7: Revised Bloom's Taxonomy

Note:

- For the theory courses, while writing the COs, restrict between Blooms Level 1 to Level 4.
- For the laboratory courses, while composing COs, restrict between Blooms Level 1 to Level 5.
- For mini-project and major projects, extend up to Blooms Level 6 while composing COs

8. CO – PO and CO – PSO mapping of courses

Before developing the relationship between the CO and PO, it is necessary to understand the action verbs used in the PO statements. The table shows the PO with action verbs and corresponding Bloom's levels.

PO	Action verbs (keyword) in PO	Blooms Level for PO
PO1	Apply	L3
PO2	Identify	L2
	Formulate	L6
	Review	L2
PO3	Design	L6
	Develop	L3, L6
PO4	Analyze	L4
	Interpret	L2, L3
	Design	L6
PO5	Create	L6
	Select	L1, L2, L6
	Apply	L3
PO6-PO12	-	-

Fig 8: PO Action Verbs related to Bloom's Level

All the courses in the curriculum must cover all the POs (and PSOs). Most of the time, the appropriate keyword of PO and CO is sufficient for mapping. 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). The various correlation levels are:

- **"1"** – Slight (Low) Correlation
- **"2"** – Moderate (Medium) Correlation
- **"3"** – Substantial (High) Correlation
- **"-"** indicates there is no correlation.

A sample CO-PO matrix is shown below

CO1	Classify the continuous time and discrete time signals and systems.
CO2	Apply the knowledge of systems to obtain the properties of LTI systems.
CO3	Use the convolution operator to compute the response of LTI system.
CO4	Design the spectral characteristics of signals using Fourier analysis.
CO5	Use the properties of Fourier analysis for solving complex problems.
CO6	Analyze the discrete time system in Z domain.

Mapping of CO v/s PO:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	1	-	-	-	-	-	-	-
CO4	-	3	2	-	-	-	-	-	-	-	-	-
CO5	-	3	2	1	-	-	-	-	-	-	-	-
CO6	3	3	-	-	-	-	-	-	-	-	-	-

Fig 9: Sample CO-PO Matrix

8.1 Process involved in CO-PO Mapping

The role of CO-PO mapping will be assigned to the faculty involved in the teaching-learning process of that particular course. After the course (subject) allotment by the department, the course coordinator of the course has to write appropriate COs for their corresponding course discussing with subject handling faculty members. It should be narrower and measurable statements. By using the action verbs of learning levels (Bloom's Taxonomy), COs will be designed. 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 the PO and PSO's of the department. The Course Outcome attainment coordinator has to consolidate the COs of the respective year and maintains 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.

9. CO ATTAINMENT PROCESS

This is the overall process of evaluating the extent to which students have achieved the intended learning outcomes or goals of a specific course. COs are evaluated based on the performance of students in Direct Assessment & indirect Assessment.

9.1 CO Attainment Process for Theory Subjects

The various metrics used to evaluate COs for a theory subject is given in Fig 10 below
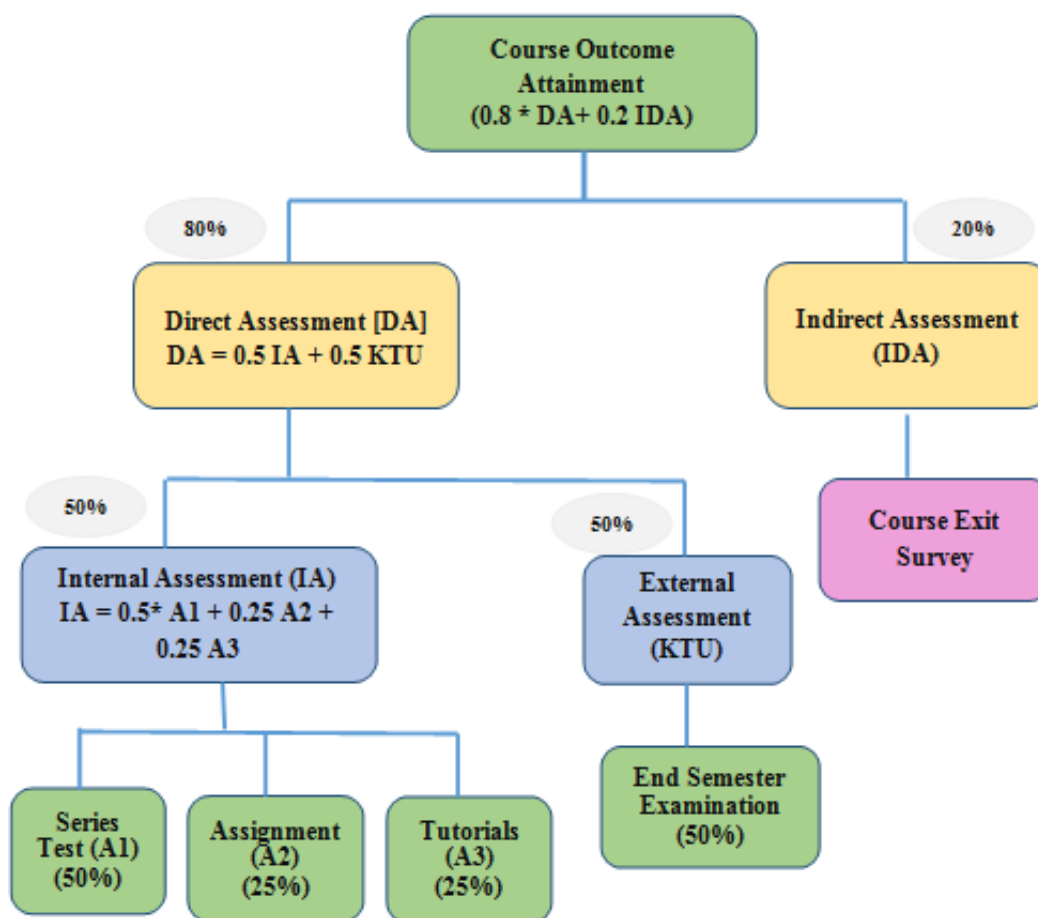

Fig 10: Course Attainment Calculation Process for Theory Subjects

Step 1: Fixing Attainment Levels

Course outcomes of all courses are assessed with the help of assessment tools such as series test, assignments, tutorials and attainment level is evaluated based on set attainment rubrics. 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.

- If 70% and more students scored above set attainment level then the Course attainment level is 3.
- If 60 to 69 % of students scored above set attainment level, then the Course attainment level is 2.
- If 50 to 59 % of students scored above set attainment level, then the Course attainment level is 1.

- If less than 50 % of students scored below the set attainment level, then the Course attainment level is 0.

If the average attainment of a particular course in the previous two consecutive years is greater than 70% of the maximum attainment value (i.e. 70% of 3 = 2.1), then for that particular course the current rubrics for attainment must be changed to analyze continuous improvement.

Step 2: Setting Targets for CO Calculation

For every course, each Assessment metric is given a target which is expected to be met after the completion of that particular course. And considering the target of each metric, an overall CO attainment target is set.

- **First time**

While assessing a new course the rules for setting the target is different from that of already existing courses

1. For Internal Assessment:

Series Test:	• For a new Course, start with no. of students scoring 45% marks
Assignment/ Tutorials:	For a new Course, start with no. of students scoring 75% marks
Continuous Evaluation in Labs/Project/Seminar:	For a new Course, start with no. of students scoring 50% marks

2. For External Assessment

End Semester Examination	• For a new Course, start with no. of students scoring 45% marks

- **Subsequent Academic Years**

Series Test, Assignment/ Tutorials, Continuous Evaluation in Labs, End Semester Exam	• Marks for the same Course and Not less than Previous Year Target, Continuous Improvement Desirable

Target is set for each metric and an overall CO attainment target is fixed for a course. Thefollowing method is used in setting the CO Target

Overall CO Target %=	• $\dfrac{\Sigma\, Target\% *\, Max\, Marks}{\Sigma\, Max\, Marks}$ X100
Overall CO Target Index=	• Overall CO Target% x 3

Step 3: CO Direct Attainment Calculation

After setting the target and fixing the attainment levels, CO Direct Attainment is calculated for every theory course of an academic year

CO attainment =	DA = 0.5 IA+0.5 KTU

Step 4: Indirect Attainment Rubrics and Final CO Attainment Calculation

The Indirect Assessment method used is Course Exit Survey. The course exit survey is based on the feedback taken from the students after studying each course. A course exit survey is conducted to know how effectively each course outcome was attained, from a student perspective. These evaluations are confidential and anonymous to prevent bias in the grading process.

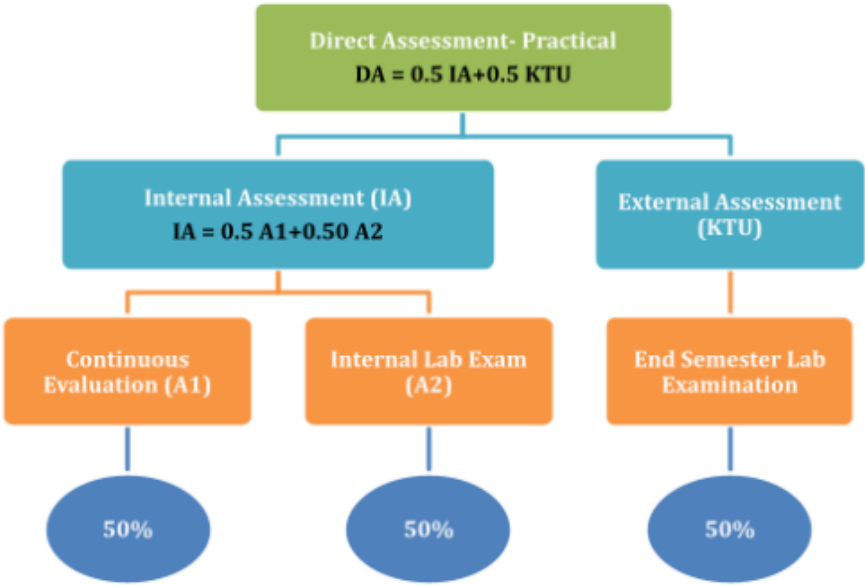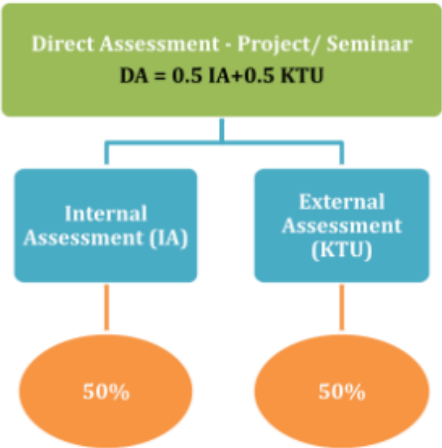| Department and College Name								
COURSE EXIT SURVEY, Month and Year								
COURSE NAME:								
COURSE OUTCOMES								
After successful completion of the student will be able to								
CO-1:								
CO-2:								
CO-3:								
CO-4:								
CO-5:								
CO-6:								
COURSE EXIT SURVEY								
To what extent you think you achieved these COs?								
You may write 5 for "Excellent", 4 for "very good", 3 for "good", 2 for "satisfactory", 1 for "Poor" and 0 for "not achieved"								
Roll No.	Name of the Student	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6	SIGNATURE

Fig 11: Sample of Course Exit Survey
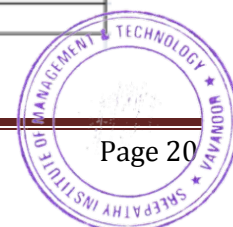
Considering the Indirect Assessment, i.e course exit survey, is taken into account and the Course attainment for a CO is calculated as

Course Outcome Attainment
(0.8 * DA+ 0.2 IDA)

9.2 CO Attainment Process for Practical Subjects

Direct Assessment- Practical
DA = 0.5 IA+0.5 KTU

Internal Assessment (IA)
IA = 0.5 A1+0.50 A2

External Assessment (KTU)

Continuous Evaluation (A1)

Internal Lab Exam (A2)

End Semester Lab Examination

50%

50%

50%

9.3 CO Attainment Process for Project/Seminar Subjects

Direct Assessment - Project/ Seminar
DA = 0.5 IA+0.5 KTU

Internal Assessment (IA)

External Assessment (KTU)

50%

50%

9.4 Remedial Measures

Every course of a program is defined with respect to course outcomes and each faculty will define a CO attainment target at the beginning of a semester. The CO attainment assessed directly and indirectly will be compared against the specified CO attainment target.

If targets are achieved for that year, higher targets can be set (increase the target at least by 2%) for the following academic year as a part of continuous improvement.

If targets are not achieved, for the identified gaps in CO attainment, an action plan should be prepared to attain the target in the subsequent years. It can be addressed either by refining the CO target or by improving the Teaching-Learning process.
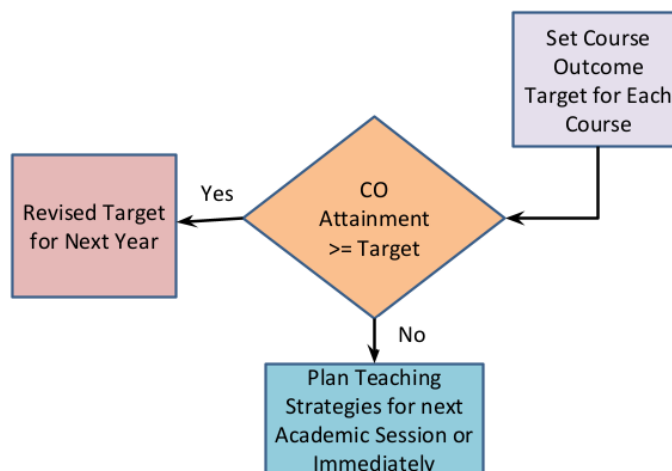

Fig 12: Remedial Measures if target not achieved

The template for Action Plan is given here:

SREEPATHY INSTITUTE OF MANAGEMENT & TECHNOLOGY, VAVANOOR, PALAKKAD -679533

CO ATTAINMENT GAP ANALYSIS

Department:
Course Code: Academic Year: Batch:
Course Name:
Faculty:

CO	TARGET CO	ATTAINED CO VALUE	TARGET ACHIEVED OR NOT?	ACTION PROPOSED TO BRIDGE THE GAP	MODIFICATION OF TARGET	OTHER REMARKS
CO1						
CO2						
CO3						
CO4						
CO5						
CO6						

Fig13: Template for recording remedial measures

10. PROGRAM OUTCOME (PO)/PROGRAM SPECIFIC OUTCOME (PSO) ASSESSMENT

At the end of each academic year, after the university examination results are published, 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. The attainment level may be set by the particular program or commonly by the institution. The attainment can be made as best the choice by the institution or the program by analyzing the student's knowledge. This can be achieved by using different supporting activities.

This attainment is mainly for the purpose of making an engineer with good analytical, practical and theoretical knowledge about the program by attaining the PO's and PSO's of the program and the institution. The CO attainment values and the CO-PO mapping are used to get the PO direct attainment values.

For the indirect evaluation and assessment of PO's and PSO's, assessment tools used is the Program Exit survey which is based on the feedback collected from graduates at the end of the program.
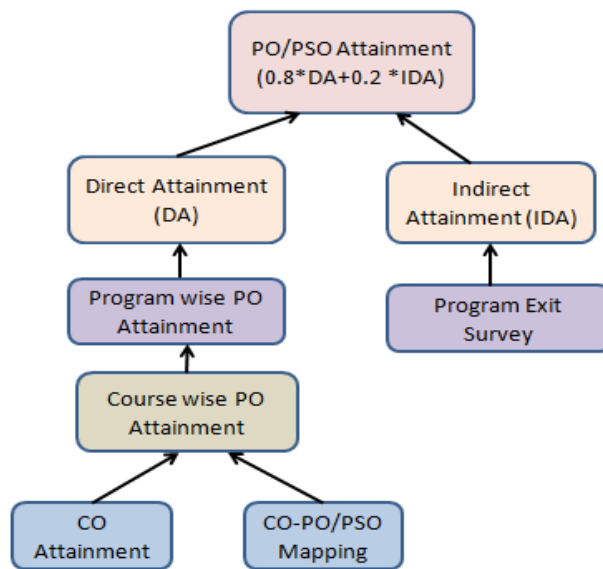
Fig14: PO Attainment Calculation Process

A sample mapping of CO-PO for one particular subject is shown below:

CO	Overall Attainment	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
EC101.1	2.08	3											
EC101.2	2.56	3	3	3									
EC101.3	2.4	2						3					
EC101.4	2.2	--									3		
EC101.5	1.9	3								3			

Direct Attainment of PO1 = (2.08+2.56+2.4×0.66+1.9)/4 = 2.031

Let the Indirect attainment of PO1 be 2.7

PO1 overall attainment = 2.031×0.7+2.7×0.3   = 2.232

Fig 15: Sample PO Attainment Calculation

11. ANALYSIS OFPROGRAM EDUCATIONAL OBJECTIVE(PEO)

Analysis of the Program Educational Objectives (PEOs) is done by considering the PO attainment values and indirect measurements. Placement record, higher studies and survey forms like alumni survey and employer survey are used to analyze the attainment of PEOs. The PEOs are formally reviewed by the Department advisory board every year. As described above, we solicit feedback from alumni and their employer through formal and informal mechanisms.

Alumni Feedback

This feedback is about how effectively they can implement their knowledge acquired through the B .Tech- Program from the institute in their workplace.

Employer Feedback

This feedback from the employers' point of view indicates how the alumni of the department are able to implement their knowledge in the company.

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