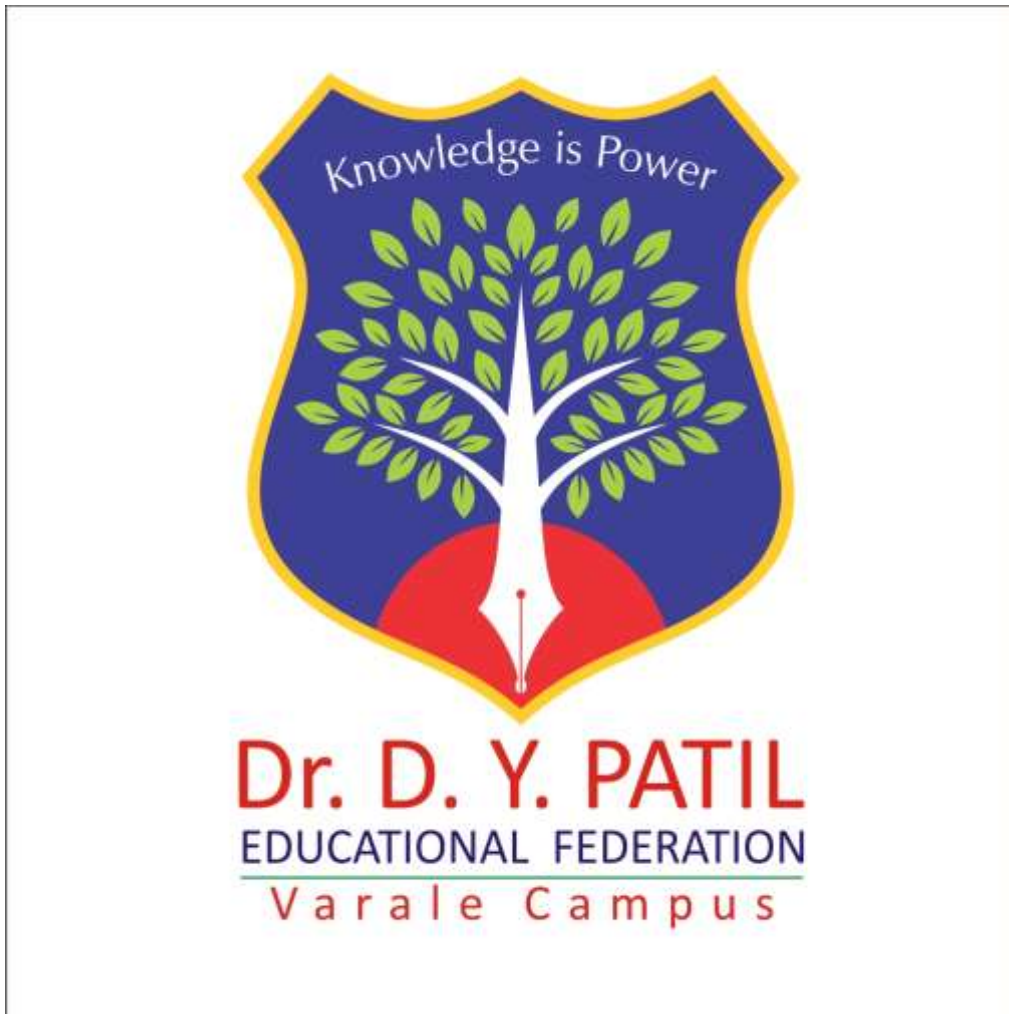




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# DYPCOEI-OBE PROCESS MANUAL

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**JUNE 1, 2021**

Dr. D. Y. Patil College of Engineering and Innovation

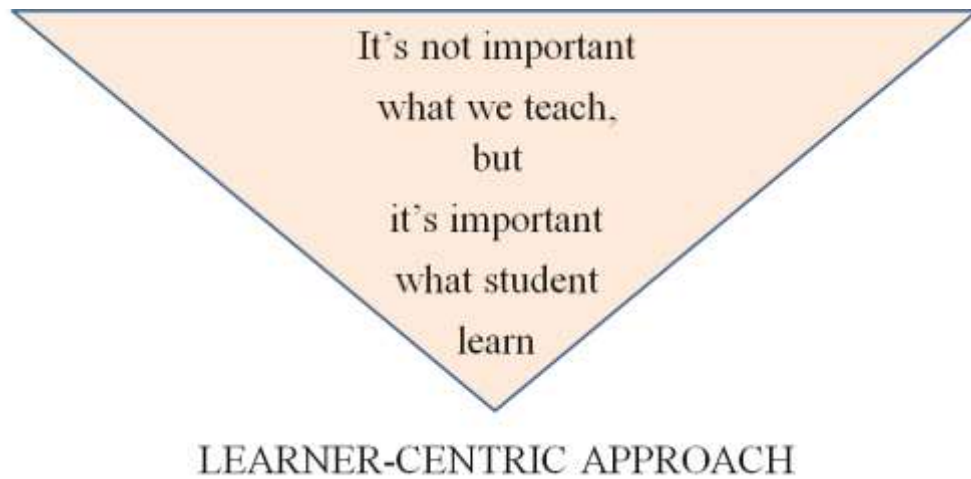
# Preamble

This process manual is intended to help teachers, staff, students and other stakeholders understand the tenets of Outcomes Based Education (OBE) system, implemented at Dr. D. Y. Patil College of Engineering and Innovation (DYPCOEI) from the academic year 2021. It offers a thorough illustration of outcome-based education that is carried out using the four stages of educational procedure, comprising academic planning, teaching-learning process, assessment/evaluation, and continuous quality improvement. OBE focuses on the accomplishment of the outcomes by the students at each level and gain qualitative progress in their learning. The Graduate Attributes are considered while designing and framing the Institution's Vision and Mission. The Programme Educational Objectives (PEO), Programme Specific Outcomes (PSO), Programme Outcomes (PO) and Course Outcomes (CO) are formulated to achieve the aims of the Graduate Attributes. This process manual facilitates the drafting of an effective curriculum execution plan, instructional strategy, assessment and evaluation of programs that running at DYPCOEI.

**Outcome-Based Education (OBE)** is an educational approach and a learning philosophy, focusing and organizing the entire academic programs (curriculum) and instructional efforts around clearly defined 'outcomes' we want all students to demonstrate when the complete the program. It is a student centered instruction model that focuses on measuring student performances through outcomes. Outcomes are usually expressed in terms of a mixture of knowledge, skills, abilities, attitudes and understanding that a student will attain as a result of his/her successful engagement in a particular set of higher education experience.

The traditional teaching system in education focuses on teachers' inputs and presume that learning has occurred. OBE is focusing on "what the students are capable of doing".

The OBE is learner centric approach in which, it's not important what we teach, but it's important what student learn



**Figure 1: Learner Centric Approach**

There is clarity on what is to be achieved and that achievement (outcome) is pre-determined. OBE goes beyond usual 'structured tasks. It demands the students to actively engaged in the learning process and demonstrate his/her skills through more challenging tasks and higher order of thinking. OBE provides a focus for assessment and help employers understand program benefits.

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. So, for an Engineering Institution to be accredited by NBA it should compulsorily follow the OBE model. Similarly, NAAC is also now following the same path and OBE is benchmarked as a standard for accreditation.

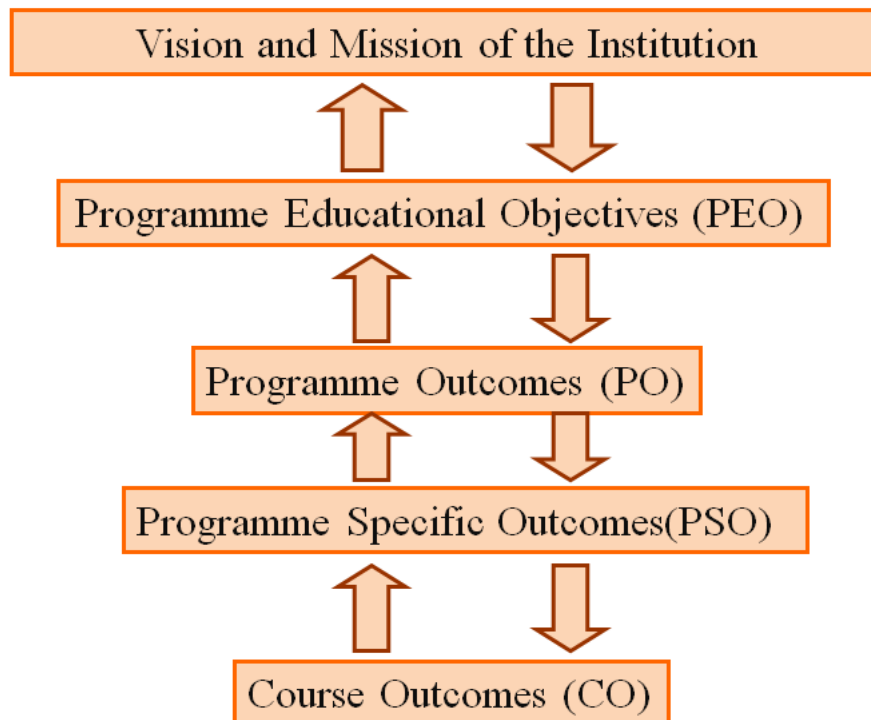
# Terminology (Abbreviations)

***Terminology (Abbreviations) used in this manual are as follows:***

- **Outcome-Based Education (OBE)** is a student-centric teaching and learning methodology in which the course delivery, assessment are planned to achieve stated objectives and outcomes. It focuses on measuring student performance i.e. outcomes at different levels.
- **Course** is defined as a theory, practical or theory cum practical subject studied in a semester. For Example, Engineering Mathematics
- **Course Outcomes (COs)** are what the student should be able to do at the end of a course. The most important aspect of a CO is that it should be observable and measurable
- **Programme** is defined as the specialization or discipline of a degree. It is the interconnected arrangement of courses, co-curricular and extracurricular activities to accomplish predetermined objectives leading to the awarding of a degree. For Example: B.E., Marine Engineering
- **Program Outcomes (POs)** are statements that describe what the knowledge, skills and attitudes students should have at the time of graduation from an engineering program. That means just at the end of 4 years these represent what is the knowledge, skills and attitudes they should have. And at present POs are 12 in number and they are identified by NBA and are applicable to all engineering programs.
- **Program Educational Objectives (PEOs)** are broad statements that describe the career and professional accomplishments in four to five years after graduation that the program is preparing the graduates to achieve
- **Program Specific Outcomes (PSOs)** are outcomes that are specific to a program. PSOs characterize the specificity of the core courses of a program. PSOs can be 2 to 4 in number.
- **Assessment** is one or more processes carried out by the department that identifies, collect, and prepare data to evaluate the achievement of POs and PSOs. programme outcomes.

- **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.

## Key Parameters of OBE



**Figure 2: Key Parameters of Outcome Based Education**

The DYPCOEI has established a Vision and Mission through a consultation process involving the stakeholders of the department, considering the societal requirements. The department's Vision and Mission are framed within the department that are derived from the Institutional Vision and Mission statements. 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. 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. The DAB consolidates these statements and recommends to the College Development Committee (CDC). Finally, the Governing Body (GB), approve the finalized Vision and Mission

statements of the department. The department takes measures to disseminate these statements among the stakeholders.

## Levels of Outcomes

Outcomes are the learning results that the students demonstrate at the end of their learning experiences. Outcomes reflect what students can actually do with what they know and have learned as part of their programme of study. Outcomes include knowledge, skills and attitudes attained after four years of graduation. In OBE, the outcomes for higher education programmes are defined at three levels as Programme Outcomes (POs), Programme Specific Outcomes (PSOs) and Course Outcomes (COs) as shown in **Figure 3**.



**Figure 3: Levels of Outcomes in OBE**

Graduate Attributes (GAs) refer to the skills, knowledge and abilities of the graduating students, beyond disciplinary content knowledge, that are applicable in a range of contexts in their lives. The GAs are essential for employability and hence serve to enhance the development of students' academic, specialist and technical competencies defining a higher education experience and equipping them with transferrable skills that can be applied in different environments. At the successful completion of four years for UG programmes, the graduates of DYP COEI will be able to attain the GAs defined in terms of POs.

## Program Outcomes (POs):

Program Outcomes (POs) represent the student learning outcomes that are defined as the knowledge, skills, or behaviours that a student should be able to demonstrate upon completion of the programme and are statements written in accordance to the graduate attributes.

**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.

**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.

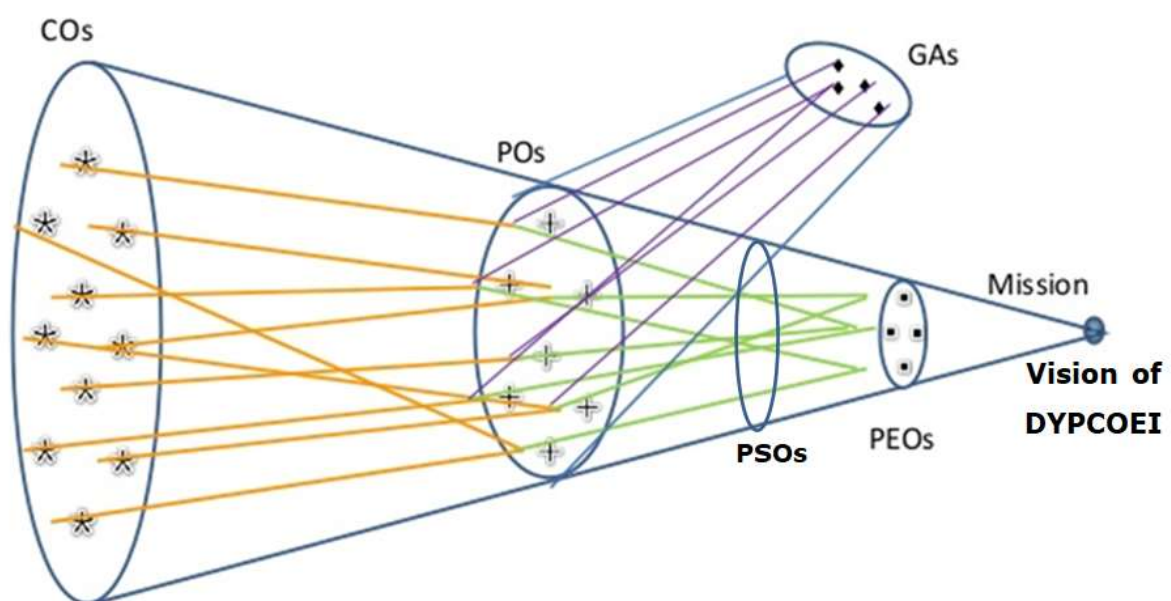
**PO9 -Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**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 life-long learning in the broadest context of technological change.

The perspective of Vision and Mission of DYPCOEI with respect to PEOs, PSOs, GAs, PEOs, and COs is as shown in **Figure 4**.



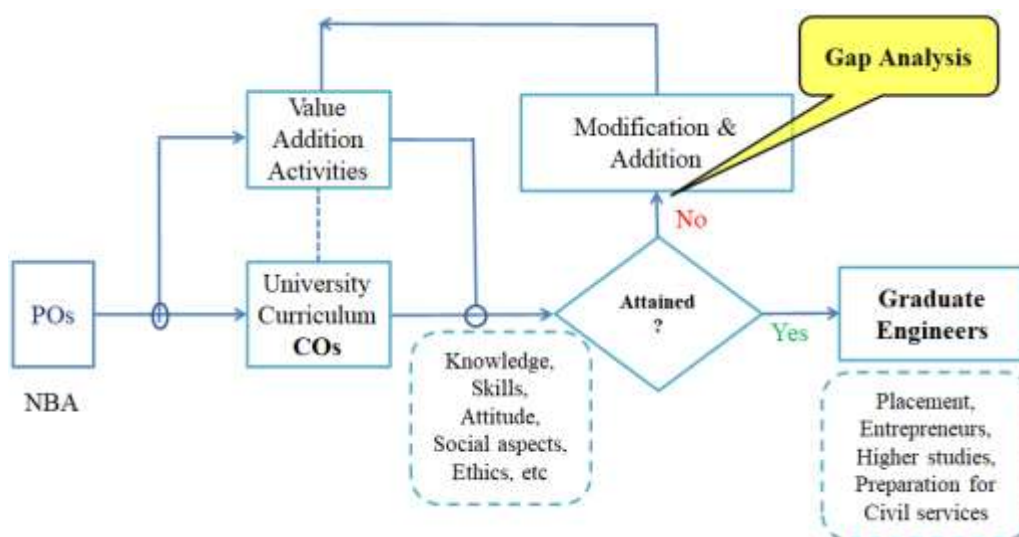
**Figure 4: Perspective of Vision and Mission of DPCOEI and Outcomes**



- The attainment of COs of all the courses of a programme correlates to the attainment of the respective POs & PSOs.
- The final attainment levels of POs and PSOs for a batch of students of a specific branch in all the four years indicate the effectiveness of the programme implemented.
- As POs are mainly formulated on the basis of GAs, achievement of POs would lead to achievement of GAs by pass outs.
- Achievement of POs and additional training/work for about four to five years after graduation would lead to achievement of PEOs.
- Achievement of PEOs would lead to achievement of mission and vision of DYPCOEI.

## IMPLEMENTATION STRATEGY OF OBE

Since OBE focusses on student competency, it concentrates on the outcomes or goals instead of just marks or scores. Therefore, the goals which could be a certain number of skills and knowledge that the learner should have at the end of the course. The assessment methods are defined to measure the achievement of these goals. The teachers take the role of being facilitators and mentors. Constructive feedback from the students also helps in reshaping the additional Value-added Programs (VAP) and activities to be given to the students as shown in **Figure 5**.



**Figure 5: GAP Analysis and addition of VAP**

The course outcomes are attained through the following instructional activities:

- Lectures
- Tutorials
- Laboratory Experiments
- Assignment Demonstration
- Projects
- Field work
- Industrial Training
- Internship
- Educational Tours
- Site Visits
- Quiz
- Discussions
- Presentation
- Case study
- Debates

## Attainment of Course Outcomes

Course Outcomes (COs) are statements that specify what a learner will know or be able to do as a result of a learning activity. Outcomes are usually expressed as knowledge, skills, or attitudes. It is a measurable, observable, and specific statement that clearly indicates what a student should know and be able to do as a result of learning. It describes what students are able to demonstrate in terms of knowledge, skills and values upon completion of a course/a span of several courses. Program Outcomes (POs) describe what a program is expected to accomplish. POs describe what students should know and be able to do at the end of the programme. POs are to be in line with the graduate attributes as specified in the NBA. Program Specific Outcomes (PSOs) are statements that describe what the graduates of a specific engineering program should be able to do. Clear articulation of COs, POs and PSOs serves as the foundation for evaluating the effectiveness of the Teaching and Learning Process (TLP). Course correlation matrix shows the learning relationship (Level of Learning Achieved) between Course Outcomes and Program Outcomes of a course.

### Attainment of Outcomes

- The Program Outcomes (POs) and Program Specific Outcomes (PSOs) are accomplished through curriculum
- Course Outcomes (COs) are defined for each course and they are mapped to POs and PSOs.

- A set of performance evaluation criteria is used for quantitative assessment of COs
- Thus, the attainment of COs provides evidence of attainment of POs and PSOs.

## Measurement of Outcome Attainment

During the course of the programme, various measurement methods are used to measure the attainment of outcomes. The assessment of outcome attainment largely depends on the student's performance output or marks obtained in final theory and practical examination, test, and submission of assignments which indicates students learning achievements. Therefore, it is necessary and important to carry out a proper attainment method in order to measure student learning achievement and to predict the student's performance in future.

There are different ways to assess student learning. Different types of assessment approaches available and the different frame works to interpret the results are as follows:

- Continuous Internal Assessment (CIA)
- Alternate Assessment Tools (AAT)
- Mid-SEM Examination (MID-SEM)
- End Semester Examination (ESE)
- Laboratory Work (PR)
- Mock Oral (OR)
- Project work Presentation and Demo
- Academic Audit Committee
- IQAC Reviews
- Course exit survey
- Programme exit survey
- Alumni survey
- Employer survey
- Course expert committee
- Department Advisory Board (DAB)
- Faculty meetings
- Professional societies

- Industrial Advisory Committee (IAC)

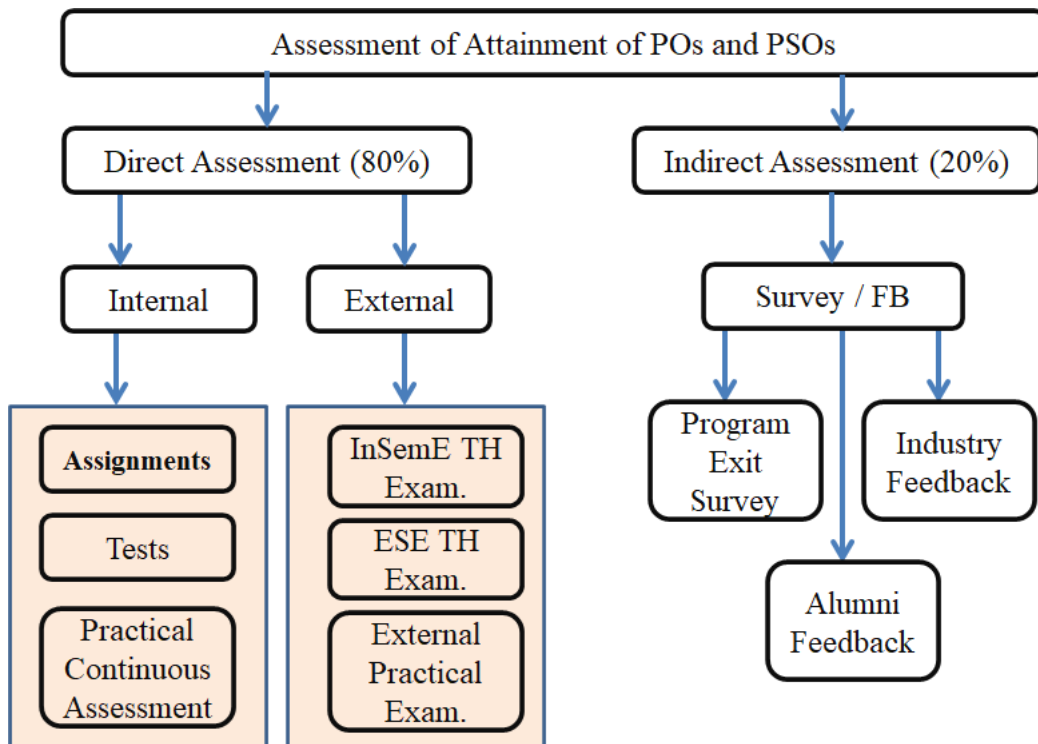
## Assessment Methods

Different methods for Assessment, Evaluation and Measurement of POs/PSOs are broadly classified as:

- Direct Assessment methods
- Indirect Assessment methods

The details of methods are as shown in **Figure 6**.

### Direct Assessment methods



**Figure 6: Assessment Methodology**

- **Continuous Assessment:** COs are assessed through Mid-SEMSPPU examination & Assignment Examinations, Home Assignments, Tests and Lab records. The COs are mapped against each question and CO analysis is carried out by faculty for

each course and documented. The contribution of COs are assessed in high, moderate and low levels, towards the attainment of POs/PSOs.

- **Mid-SEM Theory Examination:** The SPPU conducts Mid-SEM Examination (In-SEME) for the first two units of the course curriculum. The marks assigned for this examination are 30.
- **End-SEM Theory Examinations:** The questions in End SEM examinations are tested pertaining to all COs, in varying Blooms Taxonomy Levels. The SPPU conducts End-SEM Examination (ESE) for the last four units of the course curriculum. The marks assigned for this examination are 70.
- **End-SEM PR/OR Examinations:** The SPPU conducts ESE for Practical Courses either Practical or Oral examination. The marks assigned for these examinations are 25 or 50.
- **Laboratory Records:** Both continuous evaluation (in terms of term work) and End SEM examinations (in terms of PR/OR ESE) are conducted to test the COs attainment.

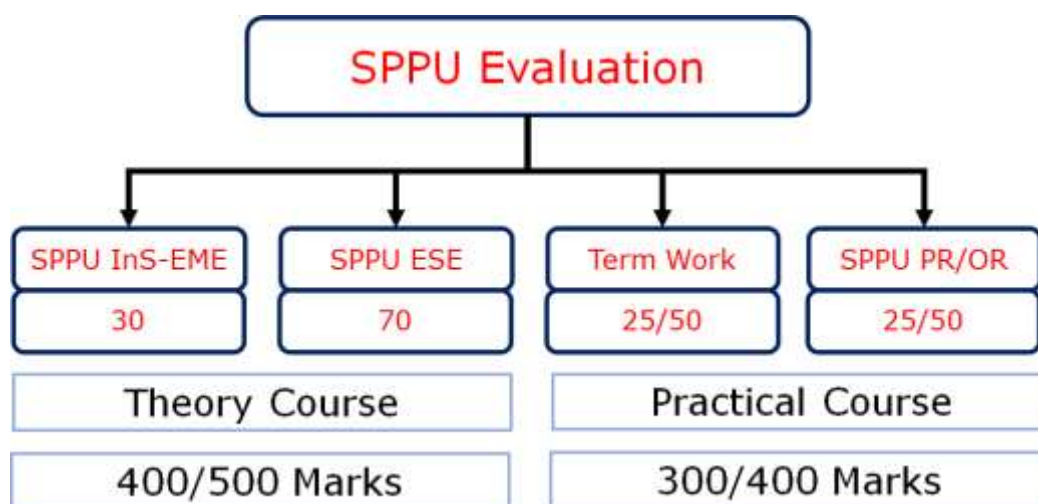
The summary of all assessment components and tools is as shown in the following table:

Sr. No.	Courses	Components/ Tools	Frequency	Max. Marks
1.	Core Course / Elective Course	Continuous Evaluation by Assignments	Continuous for every assignment for each CO	20
		<b>Mid-Semester Examinations</b>	<b>Once in a Semester by SPPU</b>	<b>30</b>
		Alternative Assessment Tools (Optional)	Once in a Semester for every assignment for each CO	10
		<b>End Semester Examinations</b>	<b>Once in a Semester</b>	<b>70</b>
2.	Laboratory	Conduction of Experiment	Once in a week/ Two time in a week for specific CO	20
		Semester End Examinations	<b>Once in a Semester by SPPU</b>	25/50
3.	PBL	Continuous Evaluation	Continuous for every CO	50

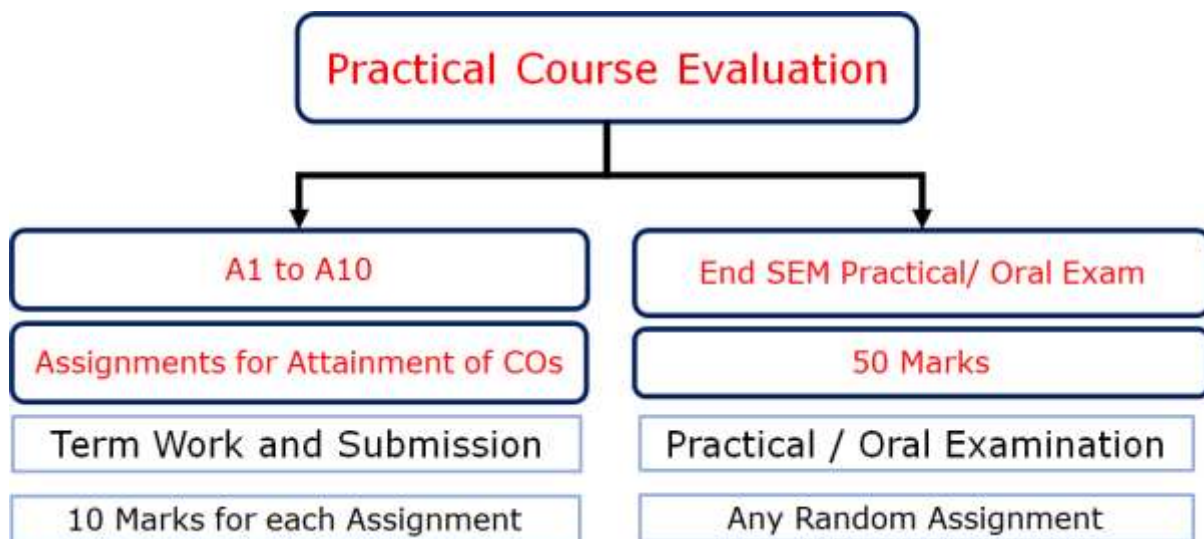
4.	Seminar	Continuous Evaluation	Continuous for every CO	50
5.	Internship	Continuous Evaluation	Continuous for every CO	100
6.	Project Work (Stage 1)	Continuous Evaluation	Continuous for every CO	50
7.	Project Work (Stage 2)	Continuous Evaluation	Continuous for every CO	100
8.	Project Work (Stage 2)	<b>End Semester Examinations</b>	<b>Once in a Semester by SPPU</b>	50

### SPPU Evaluation of Theory and Practical Courses

The summary of all SPPU assessment for any Theory and Practical Courses is given in the **Figure 7 (a)** and **Figure 7 (b)** respectively.



**Figure 7 (a): SPPU External Assessment for Theory/ Practical Courses**



**Figure 7 (b): SPPU External Assessment for Theory/ Practical Courses**

### Case Studies of Measurement of COs

Consider an example of one of the courses of BE (Computer Engineering) at second year level: 210245: Digital Electronics and Logic Design (DELD). The Teaching Scheme and Examination Scheme as per SPPU is as shown in **Figure 8**.

Savitribai Phule Pune University Second Year of Computer Engineering (2019 Course) 210245: Digital Electronics and Logic Design		
Teaching Scheme	Credit Scheme	Examination Scheme and Marks
Lecture: 03 Hours/Week	03	Mid_Semester(TH): 30 Marks End_Semester(TH): 70 Marks

**Figure 8: SPPU Teaching and Examination Scheme for 210245**

**To measure Attainment Level of COs one should have following documents:**

1. Curriculum of DELD – unit-wise mapping of COs
2. Mid-SEM Examination Question Paper and its mapping with COs
3. Answer Papers of all the students for Mid-SEM Examination
4. All Evaluated Assignments and Marks obtained by all the students
5. ESE Marks obtained by all the students
6. Marks obtained by all the students in any alternative evaluation method

## STEPS for Measurement of Attainment of COs are as follows:

### STEP-1: Deeside the target and Level of Attainment

Depending upon the performance of the students in the class, there are four possible attainment levels with their respective mapping which can be stated as:

Level of Attainment	Description towards Attainment
1	3-indicates Substantial ( <b>high</b> ) mapping (high contribution towards attainment)
2	2-indicates Moderate ( <b>medium</b> ) mapping (medium contribution towards attainment)
3	1-indicates Slight ( <b>low</b> ) mapping (some contribution towards attainment)
0	0-indicates Slight ( <b>very low</b> ) mapping (absolutely no contribution towards attainment)

For example, for the subject Digital Electronics and Logic Design (DELD):

Sr. No.	Criteria to be fulfilled	Level of Attainment
1.	60 % of the students scoring more than 45 % of maximum marks allocated	3
2.	50 % of the students scoring more than 45 % of maximum marks allocated	2
3.	40 % of the students scoring more than 45 % of maximum marks allocated	1



4.	Less than 40 % of the students scoring more than 45 % of maximum marks allocated	0
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### STEP-2: Enter Marks of Mid-SEM CO wise for CO1 and CO2

List out the Marks (XLS sheet) obtained for the Answers of questions pertaining to CO1 and CO2 in Mid-SEM examination. For example, consider the following list of 10 students shown in the table.

Question No.	Q1	Q2	Q3	Q4	Q5	Q6
Maximum MARKs	10	10	10	10	10	10
Mapping CO	CO1	CO1	CO2	CO2	CO2	CO2
Roll No						
1	7		6		4	
2		4	4			7
3	4			2		7
4	4			2		7
5		6	4			7
6		2	4		6	
7	6			6	2	
8	4			6	2	
9	2		4		2	
10	0		2		2	

Here, the mapping Answers of questions pertaining to CO1 and CO2 in Mid-SEM examination is given with Q1 and Q2 for CO1 and Q3 to Q6 for CO2. There are options in the question paper: Q1 or Q2, Q3 or Q4 and Q5 or Q6.

### STEP-3: Enter Marks of Assignments CO wise

List out the Marks (add columns in XLS sheet) obtained for the Answers of questions pertaining to CO1 in Assignments A1 to A4 with 10 marks for each assignment. For example, consider the following list of 10 students shown in the table.

Question No.	Q1	Q2	Q3	Q4	Q5	Q6	A1	A2	A3	A4
Maximum MARKs	10	10	10	10	10	10	10	10	10	10
Mapping CO	CO1	CO1	CO2	CO2	CO2	CO2	CO1	CO1	CO2	CO2
Roll No										
1	7		6		4		7	7	4	4

2		4	4			7	6	4	7	8
3	4			2		7	6	2	7	8
4	4			2		7	6	4	7	8
5		6	4			7	6	6	7	8
6		2	4		6		6	2	7	8
7	6			6	2		6	4	7	8
8	4			6	2		6	4	7	8
9	2		4		2		6	4	7	8
10	0		2		2		6	4	7	8

**STEP-4: For each Roll number (student) add marks corresponding to CO1 and CO2 to get TCO1 and TCO2 respectively in Percentage as shown in Table**

TOTAL	Attain	TOTAL	Attain
30		40	
<b>TCO1 %</b>	ACO1	<b>TCO2 %</b>	ACO1
70.00	1	45.00	0
46.67	1	65.00	1
40.00	0	60.00	1
46.67	1	60.00	1
60.00	1	65.00	1
33.33	0	62.50	1
53.33	1	57.50	1
46.67	1	57.50	1
40.00	0	52.50	1
33.33	0	47.50	1
	6.00		9.00
<b>LEVEL</b>	<b>3</b>		<b>3</b>

**STEP-5: For each Roll number (student) add marks corresponding to TCO1 and TCO2 find ACO1 and ACO2 respectively ( ACO1= 1 if TCO1 ≥ 45% or ACO1= 0 if TCO1 < 45 %) as shown in Table**

**STEP-6: Calculate the Number of students having ACO1= 1 and percentage of students having ACO1= 1**

For example, ACO1 = 6 out of 10 (60%) and ACO2= 9 out of 10 (90%)

**STEP-7: Assign the CO1 and CO2 Attainment level as per the target level se in Table**

For example, Level ACO1 = 3 and Level ACO2= 3 as shown in Table

The details of calculations and Attainment Level of CO1 and CO2 is as shown on Table (Also given in XLS file).

<b>Dr. D. Y. PATIL COLLEGE OF ENGINEERING &amp; INNOVATION</b>													
<b>Department of Computer Engineering AY 2022-23 SEM-I</b>													
<b>Course Code 210245</b>													
<b>Name of the Course - Digital Electronics and Logic Design</b>													
<b>Name of the Faculty - FirstName LastName</b>													
	Q1	Q2	Q3	Q4	Q5	Q6	A1	A2	A3	A4	TOTAL	Attain	TOTAL
	10	10	10	10	10	10	10	10	10	10	30		40
	CO1	CO1	CO2	CO2	CO2	CO2	CO1	CO1	CO2	CO2	TCO1	ACO1	TCO2
Roll No													
1	7		6		4		7	7	4	4	70.00	1	45.00
2		4	4			7	6	4	7	8	46.67	1	65.00
3	4			2		7	6	2	7	8	40.00	0	60.00
4	4			2		7	6	4	7	8	46.67	1	60.00
5		6	4			7	6	6	7	8	60.00	1	65.00
6		2	4		6		6	2	7	8	33.33	0	62.50
7	6			6	2		6	4	7	8	53.33	1	57.50
8	4			6	2		6	4	7	8	46.67	1	57.50
9	2		4		2		6	4	7	8	40.00	0	52.50
10	0		2		2		6	4	7	8	33.33	0	47.50
											<b>47.00</b>	6.00	<b>57.25</b>
											<b>LEVEL</b>	<b>3</b>	

**STEP-8: Enter Marks of Assignments A5 to A12 CO wise for CO3 to CO6 corresponding to Unit-3 to Unit-6 respectively.**

<b>Dr. D. Y. PATIL COLLEGE OF ENGINEERING &amp; INNOVATION</b>													
<b>Department of Computer Engineering AY 2022-23 SEM-I</b>													
<b>Course Code 210245</b>													
<b>Name of the Course - Digital Electronics and Logic Design</b>													
<b>Name of the Faculty - FirstName LastName</b>													
	ESE	Unit 3	Unit 4	Unit 5	Unit 6	A5	A6	A7	A8	A9	A10	A11	A12
	70	17.5	17.5	17.5	17.5	10	10	10	10	10	10	10	10
		CO3	CO4	CO5	CO6	CO3	CO3	CO4	CO4	CO5	CO5	CO6	CO6
Roll No													
1	35	8.75	8.75	8.75	8.75	7	6	8	8	4	2	3	4
2	40	10.00	10.00	10.00	10.00	6	6	9	8	3	1	4	1
3	27	6.75	6.75	6.75	6.75	4	6	8	9	4	3	3	2
4	45	11.25	11.25	11.25	11.25	4	7	7	9	3	3	3	2
5	45	11.25	11.25	11.25	11.25	5	2	9	7	2	3	4	2
6	34	8.50	8.50	8.50	8.50	3	2	8	8	3	8	3	4
7	67	16.75	16.75	16.75	16.75	9	5	8	8	3	3	2	2
8	38	9.50	9.50	9.50	9.50	2	5	7	7	2	2	5	3
9	42	10.50	10.50	10.50	10.50	8	7	7	8	3	3	5	2
10	23	5.75	5.75	5.75	5.75	4	7	6	9	4	4	5	5

**STEP-9: For each Roll number (student) add marks corresponding to TCO3 to TCO6 find ACO3 to ACO6 respectively (  $ACOn = 1$  if  $TCOn \geq 45\%$  or  $ACOn = 0$  if  $TCOn < 45\%$  ) as shown in Table ... where 'n' is the total number of COs.**

The details are as shown in Table..

	Attain		Attain		Attain		Attain
37.5		37.5		37.5		37.5	
TCO3	ACO3	TCO4	ACO4	TCO5	ACO5	TCO6	ACO6
58.00	1	66.00	1	39.33	0	42.00	0
58.67	1	72.00	1	37.33	0	40.00	0
44.67	0	63.33	1	36.67	0	31.33	0
59.33	1	72.67	1	46.00	1	43.33	0
48.67	1	72.67	1	43.33	0	46.00	1
36.00	0	65.33	1	52.00	1	41.33	0
82.00	1	87.33	1	60.67	1	55.33	1
44.00	0	62.67	1	36.00	0	46.67	1
68.00	1	68.00	1	44.00	0	46.67	1
44.67	0	55.33	1	36.67	0	42.00	0
54.40	<b>6</b>	68.53	<b>10</b>	43.20	<b>3</b>	43.47	<b>4</b>

<b>LEVEL</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>1</b>
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**STEP-10: Calculate the Number of students having ACO<sub>n</sub>= 1**

For example, ACO<sub>3</sub> = 6 out of 10 (60%), ACO<sub>4</sub>= 10 out of 10 (100%),

ACO<sub>5</sub> = 3 out of 10 (30%) and ACO<sub>6</sub>= 4 out of 10 (40%),

**STEP-11: Assign the CO<sub>3</sub> to CO<sub>6</sub> Attainment level as per the target level se in Table**

For example, Level ACO<sub>3</sub> = 2, ACO<sub>4</sub>= 3, ACO<sub>5</sub>=0 and Level ACO<sub>6</sub>= 1 as shown in Table

Sr. No	CO <sub>i</sub>	CO <sub>i</sub> Attainment
1	CO1	3
2	CO2	3
3	CO3	2
4	CO4	3
5	CO5	0
6	CO6	1

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	--	2	--	--	--	--	--	--	--	--
CO2	2	1	2	--	--	--	--	--	--	--	--
CO3	2	1	2	--	--	--	--	--	--	--	--
CO4	2	--	2	1	--	--	--	--	--	--	--
CO5	2	2	--	--	--	--	--	--	--	--	--
CO6	2	--	--	--	--	--	--	--	--	--	--
<b>PO Attainment</b>	<b>2.08</b>	<b>1.25</b>	<b>2.75</b>	<b>3.00</b>							

If there are 'n' number of COs, then PO<sub>m</sub> can be calculated as

$$PO_m \text{ Attainment} = \frac{\sum_1^n COPO_{im} \times CO_i}{\sum_1^n COPO_{im}}$$

Where, COPO<sub>im</sub> = Mapping Level CO<sub>i</sub> with PO<sub>m</sub> for i= 1 to n (for all values of 'i' having mapping to be taken from CO- PO Mapping Matrix).

CO<sub>i</sub> = Attainment of CO<sub>i</sub> and i = 1 to n (To be taken from calculation of CO attainment process)

For Example

**CO Attainments**

S.No.	CO's Number	CO Attainments
1	CO1	2.8
2	CO2	2.5
3	CO3	2.7
4	CO4	2.9
5	CO5	2.9

**CO - PO Matrix**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	1	2	-	-	-	1	1	-	-
CO2	2	2	3	1	2	-	-	-	1	1	-	-
CO3	2	2	3	1	2	-	-	-	1	1	-	-
CO4	2	2	3	2	2	-	-	-	1	1	-	-
CO5	1	1	2	1	1	-	-	-	1	1	-	-
<b>PO Attainment</b>	<b>2.73</b>	<b>2.73</b>	<b>2.75</b>	<b>2.78</b>	<b>2.78</b>				<b>2.76</b>	<b>2.76</b>		

$$PO1 = \frac{(2.8 \times 2) + (2.5 \times 2) + (2.7 \times 2) + (2.9 \times 2) + (2.9 \times 1)}{(2 + 2 + 2 + 2 + 1)} = 2.73$$

Another Example of PO Attainment for specific Course is as follows:

			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1 AT	2.500	CO1	3	2	2	2	3	0	2	3	2	3	2	2
CO2 AT	2.750	CO2	2	3	3	0	0	1	2	1	2	3	2	3
CO3 AT	2.500	CO3	1	3	2	2	2	2	2	2	1	2	2	2
CO4 AT	2.250	CO4	3	3	3	1	3	3	3	3	2	1	3	3
CO5 AT	2.250	CO5	3	1	1	2	2	2	3	3	0	2	2	3
CO6 AT	2.500	CO6	3	3	3	3	2	2	3	3	1	3	3	3
			15	15	14	10	12	10	15	15	8	14	14	16
		PO1 AT	36.500	37.250	34.750	24.250	28.750	24.000	36.500	36.250	20.000	35.000	34.250	39.250
			15	15	14	10	12	10	15	15	8	14	14	16
			2.433	2.483	2.482	2.425	2.396	2.400	2.433	2.417	2.500	2.500	2.446	2.453

	ESE				A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
	50	12.5	12.5	12.5	12.5	10	10	10	10	10	10	10	10	10
		CO1	CO2	CO3	CO4	CO1	CO1	CO2	CO2	CO3	CO3	CO3	CO4	CO4

Roll No														
1	25	6.25	6.25	6.25	6.25	4	2	6	6	7	2	6	8	8
2	35	8.75	8.75	8.75	8.75	4	3	9	8	6	1	4	9	8
3	42	10.50	10.50	10.50	10.50	4	4	5	5	4	7	6	8	9
4	28	7.00	7.00	7.00	7.00	4	2	5	9	4	1	1	7	9
5	32	8.00	8.00	8.00	8.00	1	2	5	7	5	8	8	9	7
6	45	11.25	11.25	11.25	11.25	3	2	6	2	3	8	9	2	2
7	33	8.25	8.25	8.25	8.25	4	5	6	2	9	1	2	4	3
8	38	9.50	9.50	9.50	9.50	2	2	7	7	2	2	3	7	7
9	35	8.75	8.75	8.75	8.75	5	2	7	4	2	1	1	3	3
10	15	3.75	3.75	3.75	3.75	4	2	6	9	4	4	5	6	9

### STEPS for Measurement of Attainment of POs are as follows:

The final PO attainment can be computed for a specific batch of students using following equation:

$$\text{PO attainment} = (0.8 \times \text{Direct Attainment}) + 0.2 \times (\text{Indirect Attainment})$$

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.

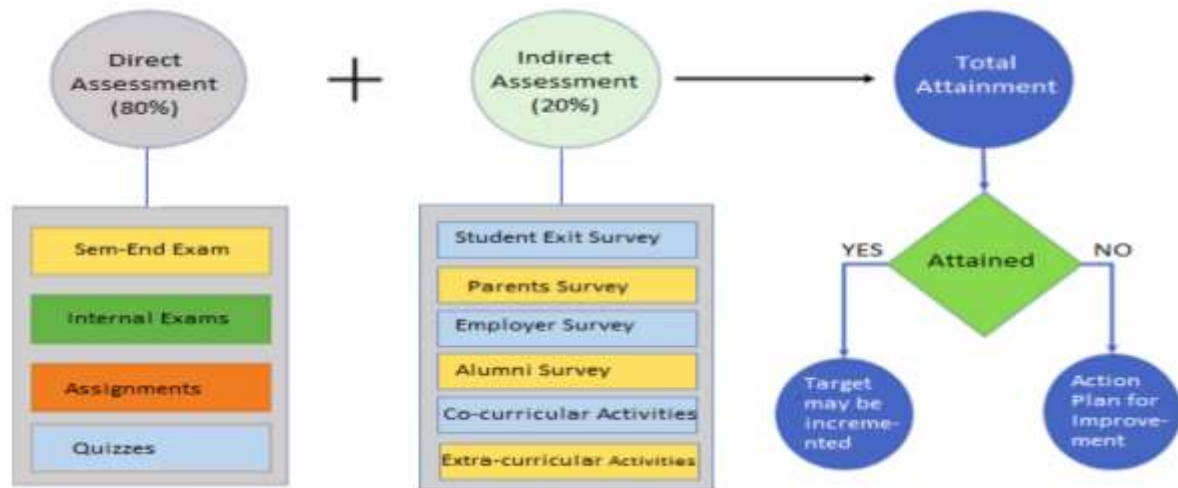
Every Faculty needs to compute two main attainment values as mentioned below. Based on that if target is not attained then appropriate actions should be taken.

#### 1) Course attainment

#### 2) PO attainment w. r. t Course

Head of the Department needs to compute batch wise PO and PSO attainment and needs to analyse the gaps and take necessary actions.

PO attainment levels and PSO attainment levels are based on attainment levels of direct and indirect assessment tools. For the overall attainment of each PO and PSO, 80% weightage is given to direct assessment and 20% weightage is given to indirect assessment. The assessment process involved in the assessment of PO/PSO is shown in the **Figure 10**.



**Figure 10: PO/PSO Attainment Procedure**

For Example, to compute the PO attainment and PSO attainment for the batch of students graduating in the academic year 'AY', we need to consider the Course to PO & PSO matrices and the respective course outcome attainments in the following academic years.

- 1 st year I Semester & II Semester courses of AYm3 Academic year
- 2 nd year I Semester & II Semester courses of AYm2 Academic year
- 3 rd year I Semester & II Semester courses of AYm1 Academic year
- 4 th year I Semester & II Semester courses of AY Academic year

The Target of PO/PSO for the current admitted batch (e.g. 2021-25) is based on the PO/PSO attainments of the previously graduated batch (e.g.: 2017-21).

If the PO/PSO attainment of the previous graduating batch is attained then the Target for the current admitted batch may be incremented by a small percentage.

If the PO/PSO attainment of the previous graduating batch is not attained then the Target for the current admitted batch may be retained or redefined by the head of the department.

However, a flexibility has been given to the head of the department to set the Target for PO/PSO attainment.



For example the attainment of PO and PSO has been calculated for 16 subjects as shown in Table

Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1
210201	1.2	1.31	1.09	1.36									
210202	2.53	2.64	2.42	2.69	2.8	2.37			2.66			1.2	
210203	1	1.11	0.89	1.16	1.27			2.56	3.8			2.53	
210204	2.56	2.67	2.45	2.72	2.83	2.66		2.01	2.34	2.56		1	
210205	2.01	2.12	1.9	2.17	2.28	3.8		2.66		2.01		2.56	2.01
210206	2.66	2.77	2.55	2.82		2.34		3.8		2.66		2.01	2.66
210207	3.8	2.78	3.69	3.77			2.56	2.34				2.66	3.8
210208	2.34	2.45	2.23	2.5	2.61		2.01				2.66		2.34
210209	2.43	2.54	2.32	2.59	2.7	2.56	2.66		1.2		3.8	2.56	2.43
210210	1.89	2	1.78	2.05	2.16	2.01			2.53		2.34	2.01	1.89
210211	2.5	2.61	2.39	2.66	2.77	2.66			1		2.56	2.66	2.5
210212	2.41	2.52	2.3	2.57	2.68				2.56		2.01	3.8	
210213	1.99	2.1	1.88	2.15	2.26				2.01		2.66	2.34	
210214	1.78	1.89	1.67	1.94	2.05				2.66				
210215	2.88	2.99	2.77	2.88			2.56						
210216	3	2.77	2.89	2.32	2.93		2.01			2.56			
210217	2.41	2.52	2.3	2.57	2.68		2.66			2.01			
210218	1.89	2	1.78	2.05	2.16					2.66			
TOTAL	41.28	41.79	39.3	42.97	34.18	18.4	14.46	13.37	20.76	14.46	16.03	25.33	17.63
<b>Average</b>	<b>2.29</b>	<b>2.32</b>	<b>2.18</b>	<b>2.39</b>	<b>2.44</b>	<b>2.63</b>	<b>2.41</b>	<b>2.67</b>	<b>2.31</b>	<b>2.41</b>	<b>0.89</b>	<b>2.30</b>	<b>2.52</b>

Therefore, the PO and PSO attainment by direct method is as shown in Table

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1
<b>Attainment</b>	<b>2.29</b>	<b>2.32</b>	<b>2.18</b>	<b>2.39</b>	<b>2.44</b>	<b>2.63</b>	<b>2.41</b>	<b>2.67</b>	<b>2.31</b>	<b>2.41</b>	<b>0.89</b>	<b>2.30</b>	<b>2.52</b>

### Indirect Assessment methods

Indirect Assessment tools such as Alumni Survey, Parent Survey, Employer Survey, Exit Survey and Parent Survey are used to compute indirect PO attainment. Each of these tools have questionnaires which contain questions that can be mapped strongly, moderately and weakly to the programme outcomes. The Departments are given flexibility to map questionnaires with POs.

**Programme – Exit survey:** This survey taken from the final year students at the completion of their B.Tech programme, stands as the comprehensive feedback for the PO/PSO assessment

- **Alumni Survey:** This survey is conducted annually through Google link or mail with the Alumni to obtain the inputs and suggestions on PO attainment in the real time societal environment
- **Employer Survey:** This survey is taken from the employer to measure the PO attainments.
- **Placement record:** The institution takes the Placement record and higher education details of the students as supporting evidences for the assessment of POs.

## Alumni Survey

<b>Alumni Survey</b>	<b>P O 1</b>	<b>P O 2</b>	<b>P O 3</b>	<b>P O 4</b>	<b>P O 5</b>	<b>P O 6</b>	<b>P O 7</b>	<b>P O 8</b>	<b>P O 9</b>	<b>P O 10</b>	<b>P O 11</b>	<b>P O 12</b>	<b>Attai n men t</b>	<b>Attai n men t Lev el</b>
The study of basic sciences and core engineering helped you in analyzing the problems at your workplace/higher studies	3												79.03	3
Are you able to identify and define the requirements for a given problem which is appropriate to its solution?		3											81.30	3
Are you able to design/develop a component/process/algorithm as per the specified requirements at your workplace?			3										79.49	3
Are you able to conduct investigations to solve complex engineering problems?				3									76.62	3
Are you able to select and use modern engineering/IT tools at your workplace?					3								77.68	3
Are you able to take contextual decisions in your professional engineering practice by considering societal and cultural issues?						3							77.98	3
Are you able to apply the knowledge of societal/environmental contexts, while arriving at a professional engineering solutions?							3						74.96	3
Are you able to work in a respectful and ethical manner with team members to complete the task?								3					87.78	3

Are you able to work effectively as an individual and/or in multidisciplinary teams?										3								86.73	3	
Are you able to comprehend and communicate effectively using appropriate verbal, non-verbal communication and documentation skills?											3								82.81	3
Are you able to handle the projects/allocated works as an individual, also as a member in a team by applying engineering and management principles?												3							85.37	3
Have you taken any certification/short-term courses to enhance your professional career? Have you contributed to publications, patents or scientific knowledge? Give brief information Have you received any Awards/Recognition? Give brief information																		3	55.27	3
<b>Alumni Survey Attainment</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>							

## Parent Survey

<b>Parent Survey</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>Attainment</b>	
Are you satisfied with the performance of your son/daughter?	1	1	1	1	1	1	1	1	1	1	1	1	78.97	3

As you satisfied with the improvement in the personality of your son/daughter as compared to the time of joining the Institute?	2	2	2	2	2	2	2	2	2	2	2	2	2	2	77.95	3
There is improvement in the studentas communication skills as compared to the time of joining the Institute?	3	3	3	3	3	3	3	3	3	3	3	3	3	3	75.90	3
How well did we do in transforming your ward into a good and responsible citizen so far?						1	2	3		1		2		80.00	3	
<b>Parent Survey Attainment</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b> <b>6</b> <b>5</b>	<b>2</b> <b>6</b> <b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>			

## Exit Survey

<b>Exit Survey</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>Attainment</b>	
I will be able to apply engineering knowledge and concepts learnt in the Program to solve problems	3												89.03	3
I will be able to analyze engineering problems.		3											89.30	3
I will be able to design and develop engineering systems based on the inputs obtained from the Program.			3										75.49	3
I will be able to conduct investigations of complex engineering, analyze, interpret the data.				3									73.62	3
I am confident of using the modern tools for solving engineering problems.					3								77.68	3



<b>Employers Survey</b>	<b>P O 1</b>	<b>P O 2</b>	<b>P O 3</b>	<b>P O 4</b>	<b>P O 5</b>	<b>P O 6</b>	<b>P O 7</b>	<b>P O 8</b>	<b>P O 9</b>	<b>P O 10</b>	<b>P O 11</b>	<b>P O 12</b>	<b>Attai n men t</b>	
Job specific skills	3	3	3	3	3	3	3	3	3	3	3	3	88.8 9	3
Problem solving skills	3	3	3	3									91.1 1	3
Individual and team work skills									3				90.0 0	3
Human Values and Professional Ethical Values								3					80.0 2	3
Modern Tool Usage			2	2	3								94.4 4	3
Verbal & Written Capabilities										3			88.2 3	3
Leadership skills										3	3		76.2 8	3
Overall job performance	3	3	3	3	3	3	3	3	3	3	3	3	83.3 3	3
Approach towards lifelong learning skills												3	84.4 4	3
<b>Employer Satisfaction Survey Attainment</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>		

<b>Survey</b>	<b>P O 1</b>	<b>P O 2</b>	<b>P O 3</b>	<b>P O 4</b>	<b>P O 5</b>	<b>P O 6</b>	<b>P O 7</b>	<b>P O 8</b>	<b>P O 9</b>	<b>P O 10</b>	<b>P O 11</b>	<b>P O 12</b>

<b>Alumni Survey Attainment</b>	3	3	3	3	3	3	3	3	3	3	3	3	3
<b>Parent Survey Attainment</b>	3	3	3	3	3	2.65	2.65	3	3	3	3	3	3
<b>Exit Survey Attainment</b>	3	3	3	3	3	3	3	3	3	3	3	3	3
<b>Employer Satisfaction Survey Attainment</b>	3	3	3	3	3	3	3	3	3	3	3	3	3
<b>Attainment through Surveys</b>	3	3	3	3	3	2.91	2.91	3	3	3	3	3	3

<b>CCA Activities</b>	<b>P O 1</b>	<b>P O 2</b>	<b>P O 3</b>	<b>P O 4</b>	<b>P O 5</b>	<b>P O 6</b>	<b>P O 7</b>	<b>P O 8</b>	<b>P O 9</b>	<b>P O 10</b>	<b>P O 11</b>	<b>P O 12</b>	<b>No of Activities</b>	<b>Attainment</b>
Guest Lectures	2	2	2	2	2			2	2	2		2	12	3
Workshops	2	2	2	2	2			2				3	3	3
Student competitions	3	3	3	3	3	2	2	2	3	2	1	3	6	3
Internships	3	3	3	3	3	3	3	3	3	3	3	3	100	3
Student presentations	2	2	1			1		2	2	3		2	140	3
CRT	1	3								3		3	140	3

<b>ECA Activities</b>	<b>P O 1</b>	<b>P O 2</b>	<b>P O 3</b>	<b>P O 4</b>	<b>P O 5</b>	<b>P O 6</b>	<b>P O 7</b>	<b>P O 8</b>	<b>P O 9</b>	<b>P O 10</b>	<b>P O 11</b>	<b>P O 12</b>	<b>No of Activities</b>	<b>Attainment</b>
ECA clubs	2	2			2		1	2	3	3		3	5	3
Entrepreneurship(SWAYAM/ED CELL)								2	3	3	2	3	5	3
NSS(includes Sahay, Street cause and all extension						2	2	2	1	3	1	3	5	3



activities)														
Sports								3	3	2		3	5	3
Inter institute literary and cultural activities								2	3	3		3	5	3

	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>
<b>INDIRECT ATTAINMENT</b>	3	3	3	3	3	3	3	3	3	3	3	3

	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>
<b>DIRECT ATTAINMENT</b>	2.65	2.62	2.64	2.65	2.70	2.69	2.84	2.84	2.76	2.77	2.77	2.64
<b>INDIRECT ATTAINMENT</b>	3	3	3	3	3	2.91	2.91	3	3	3	3	3
<b>PO ATTAINMENT</b>	2.72	2.69	2.67	2.72	2.76	2.75	2.88	2.87	2.81	2.81	2.82	2.71

<b>Course Code</b>	<b>Course Name</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>
ES110CS	Computer Programming and Problem solving using C	2.5	2.1	2.5
PC440CS	Computer Architecture		2.7	
PC411CS	Java Lab	3	3	3
PC421CS	Operating System Lab	3	3	3
PC510CS	Database Management Systems	2.6	2.6	

▪				
▪				
▪				
PC520CS	Microprocessors and Interfacing	2.3	2.3	
PC511CS	Database Management Systems Lab	3	3	
PC521CS	Microprocessors and Interfacing Lab	3	3	3
PC531CS	Computer Network Lab	3	3	3
PW519CS	Mini Project	3	3	3
PC610CS	Web Programming & Services	2.9	2.8	2.7
<b>DIRECT ATTAINMENT</b>		2.70	2.69	2.70

<b>CCA Activities</b>	<b>PS O 1</b>	<b>PS O 2</b>	<b>PS O 3</b>	<b>No of Activiti es</b>	<b>Attain ment Level</b>
Guest Lectures	3	3		10	3
Workshops	1		2	3	3
Student competitions	2	2		6	3
Internships	2	2	2	80	3
Student presentations	1	1	1	10 2	3

<b>ECA Activities</b>	<b>PS O 1</b>	<b>PS O 2</b>	<b>PS O 3</b>	<b>No of Activiti es</b>	<b>Attain ment Level</b>
CRT	2	2	2	50	3
ECA clubs			1	5	3
Entrepreneurship (SWAYAM/ED CELL)	1			5	3
NSS (includes Sahay, Street cause and all extension activities)			1	5	3
Sports			1	5	3
Inter institute literary and cultural activities			1	5	3
<b>Indirect Attainment</b>	<b>3</b>	<b>3</b>	<b>3</b>		

	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>
<b>DIRECT ATTAINMENT</b>	2.70	2.69	2.70
<b>INDIRECT ATTAINMENT</b>	3	3	3
<b>PSO ATTAINMENT</b>	2.76	2.75	2.76

## Dr. D. Y. PATIL COLLEGE OF ENGINEERING & INNOVATION

Varale, Near Talegaon Railway Station,

Tal. Maval, Dist. Pune

### Alumni Survey

#### DEPARTMENT OF

We are keen to hear from you. Please spend a moment and respond to this survey. This survey is important to the department as it facilitates the improvement of the program offered by the department based on your feedback. The Future students will get benefited from your valuable feedback. Please take some time to respond to this survey.

#### Personal Information

<b>Name</b>	
<b>Department</b>	
<b>Year of Graduation</b>	
<b>Organization/Company details</b>	
<b>Designation</b>	
<b>Nature of Work</b>	
<b>Past Experience, if any</b>	
<b>Mobile Number</b>	
<b>Email ID</b>	
<b>Residential Address</b>	
<b>Are you an Entrepreneur? If "Yes" specify the company Name and address</b>	Yes/No

## Alumni Survey Questionnaire

SN	<b>Questionnaire for your Qualification Improvement</b>	<b>Details</b>
1	Have you pursued higher education? If "yes" please specify the following	
a.	What is your masters' degree that you pursued? (M.S / M. Tech. / MBA / Any other)	
b.	Enter you Scores (GRE, TOEFL, IELTS, CAT/XAT, GATE, GMAT)	
c.	Name & Place of the University and Year of Admission	
2	Have you taken any certification/short-term courses to enhance your professional career? If "Yes" please specify the name/s	
	Have you contributed to publications, patents or scientific knowledge? If "Yes", give brief information	
3	Have you received any Awards/Recognition? If "Yes", give brief information	

**Use (✓), for giving your consent for the following questionnaire**

SN	<b>Questionnaire for Graduation Outcome</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Disagree</b>
1	The study of basic sciences and core engineering helped you in analyzing the problems at your workplace/higher studies			
2	Are you able to identify and define the requirements for a given problem which is appropriate to its solution?			
3	Are you able to design/develop a component/ process/ algorithm as per the specified requirements at your workplace?			
4	Are you able to conduct investigations to solve complex engineering problems?			
5	Are you able to select and use modern engineering/IT tools at your workplace?			
6	Are you able to take contextual decisions in your professional engineering practice by considering Society and Cultural issues			
7	Are you able to apply the knowledge of societal/environmental contexts, while arriving at a professional engineering solution?			

8	Are you able to work in a respectful and ethical manner with team members to complete the task?			
9	Are you able to work effectively as an individual and/or in multidisciplinary teams?			
10	Are you able to comprehend and communicate effectively using appropriate verbal communication and documentation skills?			
11	Are you able to handle the projects/allocated works as an individual, also as a member in a team by applying engineering and management principles?			
12	Suggestions, if any, for the betterment of your department 1. 2. 3.			
13	Areas in which you will be interested to associate with the college (Pl. tick mark)  a. I Can take sessions in _____ (Specify technical, industryorientation, soft skills etc.)  b. I can deliver Career guidance sessions for higher education.  c. I can connect our college to any organization interested to provide internship, projects and placements to our students including referrals.  d. I can institute awards for meritorious students.  e. Any other areas. Please specify _____			

**Date:**  
**SIGNATURE**




**Place:**

## **Bloom's Taxonomy of Educational Objectives**

Bloom's Taxonomy is a hierarchical model that categorizes learning objectives into varying levels of complexity (arranged in an order), from basic knowledge and comprehension to advanced evaluation and creation (Bloom, 1956). The taxonomy provides different levels of learning objectives, divided by complexity. Only after a

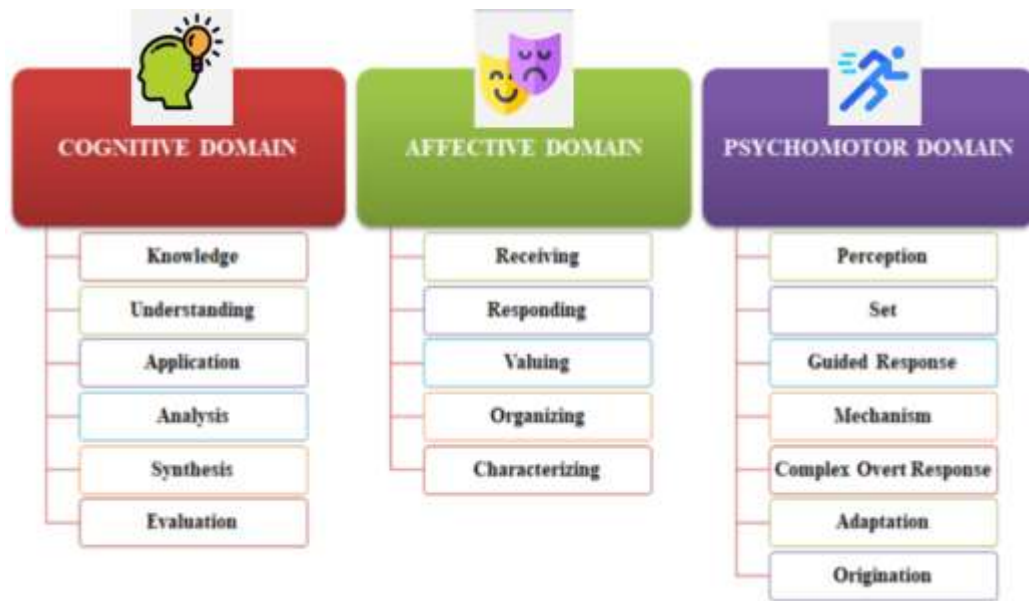
student masters one level of learning goals, through formative assessments, corrective activities, and other enrichment exercises, can they move onto the next level (Guskey, 2005). Bloom's Taxonomy should be applied when creating learning objectives. At the end of the learning process, the goal of Bloom's taxonomy is that a student has sharpened a new skill, level of knowledge, and/or developed a different attitude towards the subject. Also, teachers are able to effectively evaluate this learning on an ongoing basis, as the course moves through each stage of the framework.

Bloom's Taxonomy comprises of three learning domains: cognitive, affective, and psychomotor as shown in **Figure 7**.

Domains of Learning	Mode of Learning	Example Abilities
 <i>Cognitive Domain</i>	<i>Thoughts/ Thinking</i>	<i>Memorizing, Reasoning etc.</i>
 <i>Affective Domain</i>	<i>Emotions/ Feeling</i>	<i>Appreciation, Motivation etc.</i>
 <i>Psychomotor Domain</i>	<i>Actions/ Doing</i>	<i>Typing, Playing etc.</i>

**Figure 7: Three Domains of Bloom's Taxonomy**

Within each domain, learning can take place at a number of levels ranging from simple to complex. 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.



**Figure 8: Three Domains of Bloom's Taxonomy and Learning**

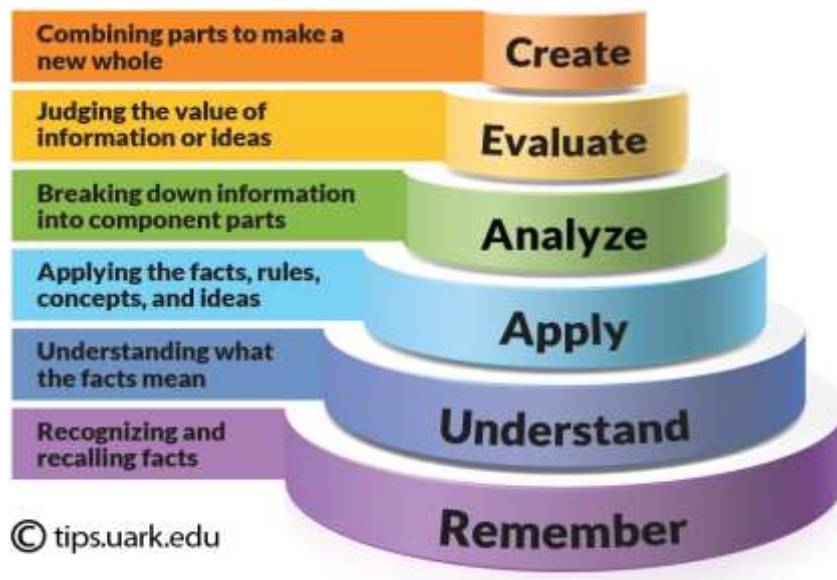
The skills that constitute a domain may range from simple to complex in nature. A scheme of classification (taxonomy) helps arrange the skills in a hierarchical manner. Each domain of human learning has its own hierarchy of skills. Simple skills are at a lower level and complex skills are at a higher level of the hierarchy. The skills at the lower level of the hierarchy are a prerequisite to developing skills at a higher level.



**Figure 9: Three Domains of Bloom's Taxonomy and Learning**

The **Figure 9** presented here depicts the hierarchy of skills in the cognitive domain. This taxonomy (a hierarchical classification) of human skills was developed in 1956 by Prof. Benjamin S. Bloom, who was the Associate Director of

the Board of Examinations at the University of Chicago. The taxonomy is a result of his work at understanding how educators evaluate a student's performance at examinations.



### References:

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