



VIGNAN'S

Foundation for Science, Technology & Research

(Deemed to be University)

-Estd. u/s 3 of UGC Act 1956

Vignan's Foundation for Science Technology and Research

Attainment of Course Outcomes (CO), Program Outcomes (PO), and Program Specific Outcomes (PSO)

Assessment of COs, POs and PSOs is a core academic activity and highly essential to assess the learning ability of the student. Programme outcome assessment is a continuous process to support teaching, learning and evaluation. It is the main mechanism to monitor the effectiveness of the learning environment based on evidences that determine whether students have met the course outcomes and objectives.

Process Involved in CO Defining and CO-PO-PSO Mapping

- Curriculum development includes description of Course Outcomes and Mapping of COs with POs/PSOs.
- Program Curriculum along with COs & POs/PSOs will be approved in Board of Studies (BoS) and Academic Council (AC).
- There is a well-defined process for attainment of COs & POs/PSOs in the organization from the last ten years.
- During the execution if any gaps were identified then necessary action will be enforced by the departmental level committee with the support of BoS & AC.
- The Departmental-Level Committee will set the target both COs & POs/PSOs prior to the commencement of the semester keeping in the view of earlier batch attainments and Current batch pass percentage.
- Course coordinators have been given with free hand in the designing of COs and mapping of COs with POs/PSOs, and the assessment tools with rubrics will be defined by the course coordinator with the due approval of departmental committee.
- The attainment of the POs/PSOs includes both direct and indirect assessment. In that 80% weightage was given for direct assessment and 20% for indirect assessment.
- The direct assessment of POs/PSOs is defined as cumulative assessment of COs.
- Indirect Assessment involves the qualitative method of obtaining the reflections of the stakeholders like Students, Alumni, Faculty, Employers, Parents and Experts on the achievement of the POs/PSOs, through feedback mechanism.
- In general, CO-PO-PSO mapping will be done by respective subject experts during the preparation of curriculum. The CO-PO-PSO mapping will be

verified/modified by respective senior faculty along with other faculties handling the same subject before the commencement of class work. The CO-PO-PSO mapping will be approved by department committee.

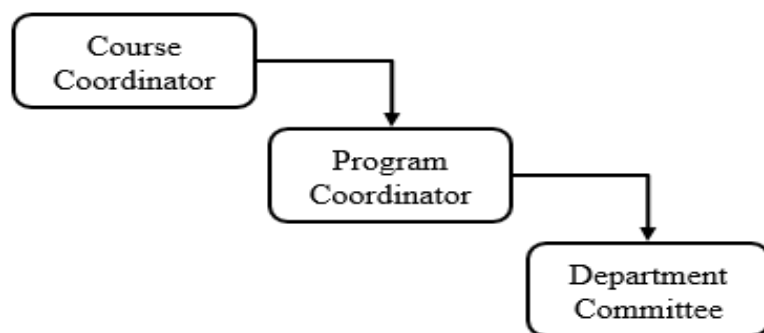


Fig 1: Members/Committee involved in CO-PO-PSO mapping

The role of CO-PO-PSO mapping will be assigned to the faculty as per hierarchy followed in figure 1. Since the department is having more than one section in a year, after the course (subject) allotment from the department, the senior faculty (subject expert) will be nominated as course coordinator of the corresponding course. The course coordinator (senior faculty) of the course along with other faculties (who handle the same subject) has to verify/modify appropriate COs for their corresponding course. It should be narrower and measurable statements. By using the action verbs of Bloom's Taxonomy levels, CO's 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 PO/PSO. The role of the course coordinator is to review the CO statements and the CO-PO-PSO mapping which has been done by course coordinators. The program coordinator (year wise coordinator) has to consolidate the CO attainment level and PO/PSO attainment level of individual course at the end of the semester. These details will hand over to DAC in order to review the overall PO/PSO attainment through direct and indirect methods. Then DAC will communicate with PMAC/CDMC regarding the review of attainment and required improvement. After consultation with the committees the information will be passed to the respective faculties in the department to follow the proposed action plan to achieve the target.

CO – PO and CO – PSO Mapping of Courses

All the courses together must cover all the POs /PSOs. For a course we map the COs to POs and PSOs through the CO-PO-PSO matrix. The various correlation levels in the matrix is as shown below.

- “1” – Slight (Low) Correlation,
- “2” – Moderate (Medium) Correlation,
- “3” – Substantial (High) Correlation,
- “-” – Indicates there is no correlation.

Course Articulation Matrix

Course Outcomes	
C214 - Signals and Systems (16EC204)	
CO1	Explain basic signals and analyze the representation using Fourier series.
CO2	Analyze continuous time signals by using appropriate mathematical tools like Fourier Transform and Laplace Transform.
CO3	Determine the response of a LTI System to any arbitrary inputs and learn about signal transmission through linear systems.
CO4	Apply the concepts of convolution and correlation for continuous time signals.
CO5	Outline the fundamentals of sampling including the implications of sampling theorem.
CO6	Analyze and demonstrate the applications of signals and systems through lab experiments and projects.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	2	2	-	-	-	-	-	-	-	3	-	-
CO2	2	3	-	2	2	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	2	2	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	2	2	-	-	-	-	-	-	-	3	-	-
CO5	2	3	-	2	2	-	-	-	-	-	-	1	3	-	-
CO6	2	3	2	2	3	-	-	-	2	2	2	2	3	-	-
Avg	2.50	2.83	2.00	2.00	2.17	-	-	-	2.00	2.00	2.00	1.50	3.00	-	-

Program Articulation Matrix

Course Code	Course Name	Program Outcomes												Program Specific Outcomes		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C214	SS	2.50	2.83	2.00	2.00	2.17	-	-	-	2.00	2.00	2.00	1.50	3.00	-	-
C215	DE	2.00	2.00	2.80	1.50	1.33	-	-	-	2.00	2.00	2.00	2.00	1.40	1.67	1.83
C222	ECA	2.17	3.00	2.00	2.00	2.00	-	-	-	2.00	2.00	2.00	2.00	1.17	-	2.00
C223	AC	2.33	2.17	2.00	2.50	2.00	-	-	-	2.00	2.00	2.00	2.00	2.67	-	-
C413	RFMW	2.83	2.33	2	2.33	2	-	2	-	2	2	-	2	3	-	-

Assessment OF COs, POs and PSOs

The assessment takes place at following levels:

- a) The Course-level Assessment
- b) The Programme level assessment

a) Course-Level Assessment:

The CO attainment levels are measured based on the results of the cumulative internal examinations and semester end examination conducted by the university. This is a form of direct measurement of attainment. For individual attainment calculations based on the assessment 60% weightage to cumulative internal examinations and 40% weightage to semester end examination, but during the final assessment level of a particular course outcome (overall attainment of COs), 40% weightage to cumulative internal examinations and 60% weightage to semester end examination.

Attainment Process of Course Outcomes

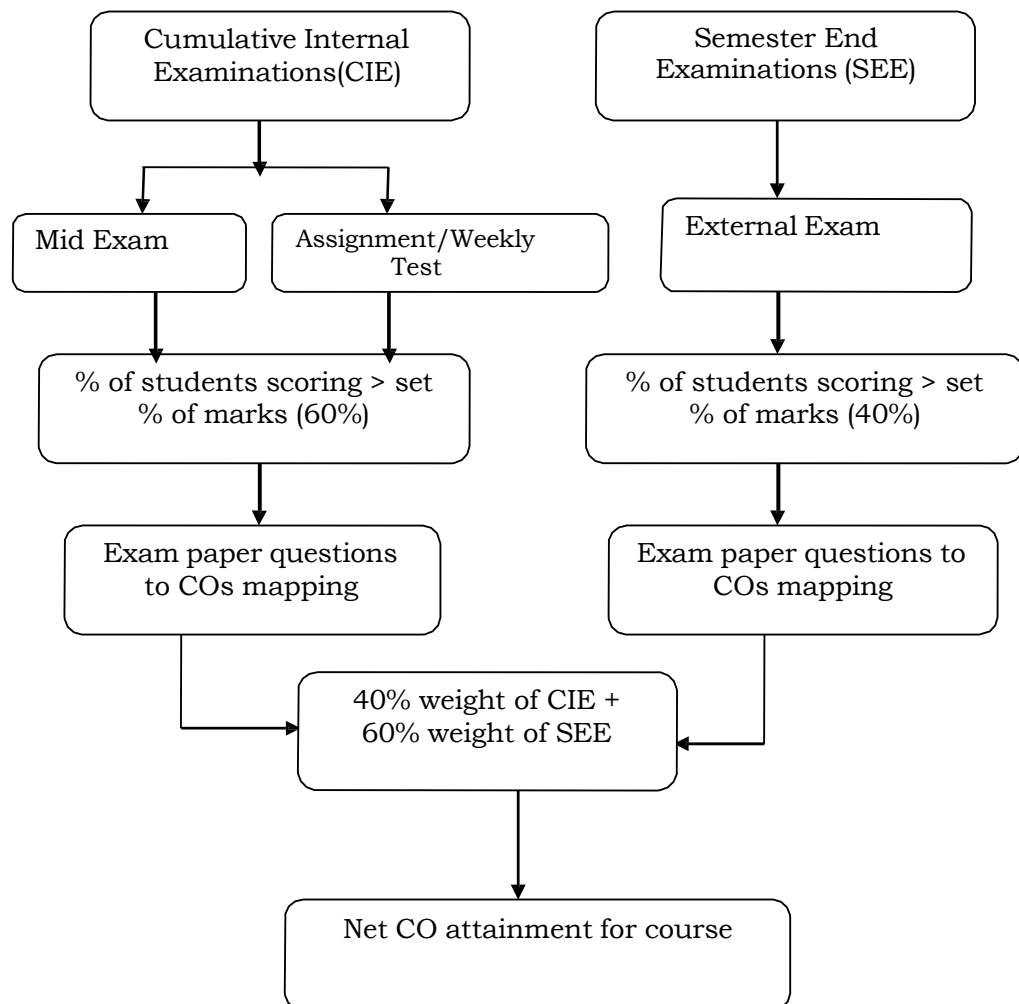


Figure: 2 CO Attainment Process for Direct Assessment

The course outcomes were prepared by using action verbs of modified Bloom's Taxonomy. The various assessment processes used to gather the data for evaluation of course outcomes are cumulative internal examinations and semester end examination.

The data for evaluation of course outcomes for cumulative internal examinations are

1. **Week Tests:** Five to six-week test will be conducted on every Monday. The maximum marks will be 10. Each question is a single question carrying ten marks (or) 2 (or) three sub questions with a total of ten marks. It is expected that a student should score at least 6 marks (60%) out of 10 marks for the attainment of that course outcome/s.
2. **Internal (Mid) Examinations:** Three Mid Examinations are conducted for 2nd, 3rd and 4th year students in each semester as per the university prescribed norms. Mid-1 is conducted from first unit and half of second unit of the course syllabus, Mid-2 is conducted for half of second unit and full third unit of the course syllabus and MID-3 is conducted from fourth and fifth units of the course syllabus. The question paper has thirty marks (ten one marks, two five marks, and one ten marks), Part-A is objective of one mark questions, Part-B have two descriptive questions with either (or) choice pattern and each carrying 5 marks weightage, out of which students have to answer any two questions. Part-C have one descriptive question with either (or) choice pattern and each carrying 10 marks weightage, out of which students have to answer any one question. So the total marks of this mid exam is 30 marks, in that the expected score of a student should be at least 18 marks (60%) for the attainment of that course outcome/s.
3. **Internal Lab Examination and CLAs:** One exam will be conducted when 5 to 6 experiments have been completed. The maximum marks will be of fifty. It is expected that a student should score at least 18 marks (60%) out of 30 marks for the attainment of that course outcome/s. As well as every week, cumulative lab assessments (CLAs) marks during every lab session also have to evaluate that session with ten marks, out of that student should score at least 6 marks (60%) out of 10 marks for the attainment of that course outcome/s.
4. **Internal Minor Project / IDPs:** The minor project is carried out during every semester by conducting two reviews with fifty marks. It is expected that a student should score at least 60% for the attainment of that course outcome/s for R16 courses. In R19 regulation, during second year, every student should carryout intra departmental project by conducting two reviews with fifty marks, and during third year, every student should carryout inter departmental project by conducting two reviews with fifty marks, out of that the student should score at least 60% for the attainment of that course outcome/s.
5. **Internal Project marks:** The project is carried out during final year (seventh or eighth semester) by conducting three reviews. First review is conducted for ten marks and other two reviews are conducted for 20 marks, so cumulatively 50 marks. It is expected that a student should score at least 60% for the attainment of that course outcome/s.
6. **Internal Internship marks:** The internship is carried out during final year (seventh or eighth semester) by conducting two reviews. Each review is conducted for twenty-five marks. It is expected that a student should score at least 60% for the attainment of that course outcome/s.

The data for evaluation of course outcomes for external examinations are

1. **Semester end examination:** These end-semester examinations are of 3-hours duration and cover the entire syllabus of the course. It would generally satisfy all course outcomes for a particular course. The question will have a total of 24 questions. The question paper has ten one mark, four either (or) choice of five marks and three either (or) choice of ten marks. The marks scored by the students in the end semester examination are used to assess the attainment level of the whole course and the same is transferred to each course outcome attainment level, while calculating the overall attainment level. It is expected that a student should score at least 40% of the maximum marks of the course for the attainment of course outcome/s.
2. **Semester end lab marks:** The end semester lab examination shall be conducted with an external examiner and the lab handling faculty/internal examiner. The external examiner will be appointed from university exam cell. These end-semester examinations are of 3-hours duration and cover the entire syllabus of the lab experiments. The end exam is evaluated for a maximum mark of fifty. It is expected that a student should score at least 40% marks for the attainment of that course outcome/s.
3. **Semester end minor project/IDP marks:** The end semester minor project (R16) / intra departmental project/inter departmental project (R19) examination shall be conducted with an external examiner and the minor project/IDP handling faculty/internal examiner. The external examiner will be appointed from university exam cell. These end-semester examinations are of 3-hours duration and the students have to demonstrate and present their projects batch wise. The end exam is evaluated for a maximum mark of fifty. It is expected that a student should score at least marks 40% for the attainment of that course outcome/s.
4. **Semester end Project work/Internship marks:** Project work/Internship is conducted during final year (seventh or eighth semester). The committee consists of an external examiner and a senior faculty member of the department shall conduct the exam along with supervisor of the respective batch. The external examiner will be appointed from university exam cell. The semester end Project work/Internship examinations are of 3-hours duration and the students have to demonstrate and present their projects/internship works batch wise. The end exam is evaluated for fifty marks. It is expected that a student should score at least 40% for the attainment of that course outcome/s.

COURSE OUTCOMES ASSESSMENT TOOLS

Attainment of Course Outcomes (COs) are narrower statements that describe what students are expected to know, and be able to do at the end of each course.

In Electronics and Communication Engineering department, the CO attainment levels are measured based on the results of the cumulative internal examinations and semester end examinations conducted by the university. This is a form of direct measurement of attainment.

The step by step process for assessing course outcomes is

Step 1: The Course coordinator analyses each course outcome into elements (different abilities specified in the outcome) and a set of attributes defined for each element (actions that explicitly demonstrate mastery of the abilities specified).

Step 2: Identify/select course syllabus that address the outcome (each unit in syllabus contributes to at least one of the outcomes).

Step 3: For each course outcome, define performance indicators (Assessment criteria) and their targets.

Step 4: The course coordinator (senior faculty member taking course) collects the qualitative and quantitative data and analyze the collected data. If the assessed data meets the performance targets which are specified in step 3, the outcome is attained. Otherwise, consider Step 5.

Step 5: The department level committee (Consist of HoD, Senior faculty and course Coordinator) recommends content delivery methods/ course outcomes/ curriculum improvements as needed.

Relevance of Assessment Tools and Process Used

The assessment process and tools are used for showing

- Relevance of process and tools with theory course, theory integrated with lab course, theory integrated with minor project course, theory integrated with lab and minor project course, project course and internship course.
 - For each theory course four to six COs are written and mapped with POs and PSOs.
 - Each question in weekly test and mid examination is mapped with corresponding COs.
 - If theory integrated with lab course, the CLAs are mapped with corresponding COs.
 - If theory integrated with minor project course, the reviews are mapped with corresponding COs.
 - If theory integrated with lab and minor project courses, based on the background knowledge, tool usage and design methods, the corresponding COs are mapped.
 - For project/internship courses four to seven COs are written and mapped with POs and PSOs. Based on the background knowledge, tool usage, design methodologies and implementation, the corresponding COs are mapped.

i) The assessment tools for internal examinations are

a) Internal theory marks

Internal theory marks are carried out by each weekly test which are held four or six times for a course in every semester and by the mid-term examinations which are held thrice for a course in every semester.

Tools used	Frequency (per semester)	Attainment levels
Weekly tests (10 marks)	4 to 6	< 70% = 1 70% to 79% = 2
Mid exams (30 marks)	3	≥ 80% = 3

b) Internal lab marks

Laboratory assessment is carried out by conducting one internal examination for each lab course, along with continuous lab evaluation marks for each experiment.

Tools used	Frequency (per semester)	Attainment levels
Continuous lab assessment (10 marks)	9 to 13	< 70% = 1 70% to 79% = 2 ≥ 80% = 3
Internal lab exam (50 marks)	1	

c) Internal minor project marks

The assessment for minor project is carried out by conducting two reviews and the cumulative mark is considered as internal mark for each minor course in every semester.

Tools used	Frequency (per semester)	Attainment levels
Internal exam (50 marks)	2	< 70% = 1 70% to 79% = 2 ≥ 80% = 3

d) Internal project work marks

The assessment for project/internship is carried out by conducting three reviews and it is considered as internal mark for project work course in final year.

Tools used	Frequency (only for final year)	Attainment levels
Internal review-1 (10 marks)	1	< 70% = 1 70% to 79% = 2 ≥ 80% = 3
Internal review-2 and 3 (20 marks)	2	

e) Internal internship marks

The assessment for internship is carried out by conducting two reviews and it is considered as internal mark for internship course in final year.

Tools used	Frequency (only for final year)	Attainment levels
Internal review (25 marks)	2	< 70% = 1 70% to 79% = 2 ≥ 80% = 3

In each test, the percentage of students who achieve a set target (usually, 60% of the maximum marks) for the COs that are covered is computed. Thus, the average of percentage of students attaining all the COs decides the CO attainment level.

ii) The assessment tools for semester end examinations are

Semester End examination is a metric for evaluating whether the COs are attained or not. Examination is more focused on attainment of course outcomes using a descriptive exam.

f) End semester theory marks

End semester theory marks are carried out by end semester examinations of every semester.

Tools used	Frequency (per semester)	Attainment levels
End semester exam (60 marks)	1	< 70% = 1 70% to 79% = 2 ≥ 80% = 3

g) End semester lab marks

End semester lab marks are carried out by end semester examinations of every semester.

Tools used	Frequency (per semester)	Attainment levels
End semester exam (50 marks)	1	< 70% = 1 70% to 79% = 2 ≥ 80% = 3

h) End semester minor project marks

End semester minor project marks are carried out by end semester examinations of every semester.

Tools used	Frequency (per semester)	Attainment levels
End semester exam (50 marks)	1	< 70% = 1 70% to 79% = 2 ≥ 80% = 3

i) End semester project/internship marks

End semester project/internship marks are carried out by end semester examinations in final year.

Tools used	Frequency (only for final year)	Attainment levels
End semester exam (50 marks)	1	< 70% = 1 70% to 79% = 2 ≥ 80% = 3

In end exam, the percentage of students who achieve a set target (usually, 40% of the maximum marks) for the COs that are covered is computed. Thus, the average of percentage of students attaining the entire COs decides the CO attainment level.

The attainment levels consider for COs attainments are

- **Attainment Level 1:** Students attained score in internal and end semester examination in between 60% to 69%.
- **Attainment Level 2:** Students attained score in internal and end semester examination in between 70% to 79%.
- **Attainment Level 3:** Students attained score in internal and end semester examination is are greater than or equal to 80%.

The above procedure is followed in R16 regulation in evaluating the attainment of CO using existing data from student marks. Each and every test is focused in attaining the course outcomes. The overall course outcome of a course is computed by considering a weightage of 40% for cumulative internal examinations and 60% for end examination.

Assessment of Course Outcomes:

The final assessment level of a particular course outcome is calculated by giving 35% weightage to internal assessment tools and 65% weightage to end semester university examination. The following example illustrates the final attainment level calculation for all course outcomes.

Example:

- The process of computing assessment tool 'a' of a course C214 (19EC202 – Signals and Systems, 03 Semester ECE) is shown in below table

CO assessment based on internal results (Weekly Examinations - Theory)

VIGNAN'S FOUNDATION FOR SCIENCE, TECHNOLOGY AND RESEARCH
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE OUTCOME ATTAINMENT (INTERNAL EXAMINATIONS-THEORY)

Course code with name:	19EC202 - Signals and Systems			Regulation:	R19
Class:	II Year ECE	Semester:	3	Section:	ALL
Faculty name:	Dr. M. Laavanya			Academic year:	2021-2022

QUESTION PAPER MAPPING TO CO'S

Examination Type	Weekly Test Examinations						
	WT 1	WT 2	WT 3	WT 4	WT 5	WT 6	WT 7
Question No.	Q1/Q2	Q1/Q2	Q1/Q2	Q1/Q2	Q1/Q2	Q1/Q2	Q1/Q2
CO1	3						
CO2				3			
CO3	2	3					
CO4			3				
CO5							
CO6							

CO ASSESSMENT BASED ON RESULT ANALYSIS

Target	60%	60%	60%	60%	60%	60%	60%
Max Marks	10	10	10	10	10	10	10
Minimum Score Set as Basis	6	6	6	6	6	6	6
No. of Students Attended	116	117	120	117			
No. of Students Attained	67	87	93	93			
Percentage of Students Attained	58%	74%	78%	79%			
Attainment Level	1.00	2.00	2.00	2.00			

Examination Type	Weekly Test Examinations							OVER ALL
	WT 1	WT 2	WT 3	WT 4	WT 5	WT 6	WT 7	
CO1	1.00							1.00
CO2				2.00				2.00
CO3	0.67	2.00						1.33
CO4			2.00					2.00
CO5								
CO6								

CO assessment based on internal results (Mid Examinations - Theory)

VIGNAN'S FOUNDATION FOR SCIENCE, TECHNOLOGY AND RESEARCH
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE OUTCOME ATTAINMENT (INTERNAL EXAMINATIONS-THEORY)

Course code with name:	19EC202 - Signals and Systems			Regulation:	R19
Class:	II Year ECE	Semester:	3	Section:	ALL
Faculty name:	Dr. M. Laavanya			Academic year:	2021-2022

QUESTION PAPER MAPPING TO CO'S

Examination Type	Mid Examinations															
	Mid-1															
Question No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
CO1	2	3	2	2	3	3	3	3					3		3	
CO2									3		2					
CO3								3	2	2		3		2		3
CO4											2	2	1	3		
CO5																
CO6																

CO ASSESSMENT BASED ON RESULT ANALYSIS

Target	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
Max Marks	1	1	1	1	1	1	1	1	1	1	5	5	5	5	10	10
Minimum Score Set as Basis	1	1	1	1	1	1	1	1	1	1	3	3	3	3	6	6
No. of Students Attended	114	117	114	113	120	114	112	120	119	113	70	83	60	71	58	99
No. of Students Attained	60	52	53	54	76	32	26	81	24	46	30	60	18	19	10	32
Percentage of Students Attained	53%	44%	46%	48%	63%	28%	23%	68%	20%	41%	43%	72%	30%	27%	17%	32%
Attainment Level	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00	1.00	1.00

Attainment of CO's

CO1	0.67	1.00	0.67	0.67	1.00	1.00	1.00	1.00					1.00		1.00	
CO2									1.00		0.67		0.67			
CO3									1.00	0.67	0.67		2.00		0.67	1.00
CO4													1.33		1.00	
CO5																
CO6																

2. The process of computing assessment tool 'b' and 'c' of a course C214 (19EC202 – Signals and Systems, 03 Semester ECE) is shown in below table

VIGNAN'S FOUNDATION FOR SCIENCE, TECHNOLOGY AND RESEARCH
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE OUTCOME ATTAINMENT (INTERNAL EXAMINATIONS - Lab & Minor Project)

Course code with name:	19EC202 - Signals and Systems			Regulation:	R19
Class:	II Year ECE	Semester:	3	Section:	ALL
Faculty name:	Dr. M. Laavanya			Academic year:	2021-2022

Examination Type	Laboratory Continuous Assessment												Internal Examination - Lab	Internal Examination - Minor Project
	CLA 1	CLA 2	CLA 3	CLA 4	CLA 5	CLA 6	CLA 7	CLA 8	CLA 9	CLA 10	CLA 11	CLA 12		
Question No.	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CO1	3	2	3	2										3
CO2					3	3								3
CO3							3	3		2				3
CO4										3	3			3
CO5									2					3
CO6	3	1	3	3	3	3	3	3	3	3	3	3	3	3

CO ASSESSMENT BASED ON INTERNAL RESULT ANALYSIS

Target	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
Max Marks	10	10	10	10	10	10	10	10	10	10	10	10	50	50
Minimum Score Set as Basis	6	6	6	6	6	6	6	6	6	6	6	6	30	30
No. of Students Attended	121	121	121	121	121	121	121	121	121	121	121	121	121	121
No. of Students Attained	119	119	118	117	118	117	118	115	115	114	114	115	108	108
Percentage of Students Attained	98%	98%	98%	97%	98%	97%	98%	95%	95%	94%	94%	95%	89%	89%
Attainment Level	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Examination Type	Laboratory Continuous Assessment												Internal Examination - Lab	Internal Examination - Minor Project	OVER ALL - Lab
	CLA 1	CLA 2	CLA 3	CLA 4	CLA 5	CLA 6	CLA 7	CLA 8	CLA 9	CLA 10	CLA 11	CLA 12			
CO1	3.00	2.00	3.00	2.00									3.00		2.60
CO2					3.00	3.00							3.00		3.00
CO3							3.00	3.00		2.00			3.00		2.75
CO4											3.00	3.00	3.00		3.00
CO5									2.00				3.00		2.50
CO6	3.00	1.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00		2.85

CO Assessment based on internal results (Lab and Minor project)

3. The process of computing assessment tool 'f', 'g' and 'h' of a course C214 (19EC202 – Signals and Systems, 03 Semester ECE) is shown in below table

CO assessment based on semester end results (Theory)

VIGNAN'S FOUNDATION FOR SCIENCE, TECHNOLOGY AND RESEARCH
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE OUTCOME ATTAINMENT (INTERNAL EXAMINATIONS-THEORY)

Course code with name:	19EC202 - Signals and Systems			Regulation:	R19
Class:	II Year ECE	Semester:	3	Section:	ALL
Faculty name:	Dr. M. Laavanya			Academic year:	2021-2022

QUESTION PAPER MAPPING TO CO'S

Examination Type	End Examinations																							
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24
CO1	3				3	3									3	3			3	3				
CO2							3	2													3			
CO3		2	2	3							2	2	3	3			3	3	2	3		3		
CO4									3	3														
CO5																								3
CO6																								

CO ASSESSMENT BASED ON RESULT ANALYSIS

Target	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
Max Marks	1	1	1	1	1	1	1	1	1	1	5	5	5	5	5	5	5	5	5	10	10	10	10	10
Minimum Score Set as Basis	1	1	1	1	1	1	1	1	1	1	3	3	3	3	3	3	3	3	6	6	6	6	6	6
No. of Students Attended	117	96	106	113	108	100	107	110	116	110	83	55	82	62	111	17	38	103	73	82	74	80	112	14
No. of Students Attained	71	48	71	51	41	52	23	23	95	74	55	37	56	12	75	8	1	39	34	53	9	31	91	4
Percentage of Students Attained	61%	50%	67%	45%	38%	52%	21%	21%	82%	67%	66%	67%	68%	19%	68%	47%	3%	38%	47%	65%	12%	39%	81%	29%
Attainment Level	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.00	1.00

Question No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Overall
CO1	1.00				1.00	1.00									1.00				1.00						1.00
CO2							1.00	0.67													1.00				0.89
CO3		0.67	0.67	1.00							0.67		1.00				1.00			1.00		1.00			0.88
CO4									3.00	1.00															2.00
CO5																							3.00		3.00
CO6																									

CO assessment based on semester end results (Lab and minor project)

VIGNAN'S FOUNDATION FOR SCIENCE, TECHNOLOGY AND RESEARCH
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE OUTCOME ATTAINMENT (EXTERNAL EXAMINATIONS- LAB, MINOR PROJECT)

Course code with name:	19EC202 - Signals and Systems			Regulation:	R19
Class:	II Year ECE	Semester:	3	Section:	ALL
Faculty name:	Dr. M. Laavanya			Academic year:	2021-2022

QUESTION PAPER MAPPING TO CO'S		
Examination Type	End Exam - Lab	End Exam -Minor Project
Question No.		
CO1	3	
CO2	3	
CO3	3	
CO4	3	
CO5	3	
CO6	3	

CO ASSESSMENT BASED ON RESULT ANALYSIS		
Target	40%	40%
Max Marks	50	50
Minimum Score Set as basis	20	20
No. of Students Attended	117	
No. of Students Attained	117	
Percentage of Students Attained	100%	
Attainment Level	3.00	

Examination Type	End Exam - Lab	End Exam -Minor Project
CO1	3.00	
CO2	3.00	
CO3	3.00	
CO4	3.00	
CO5	3.00	
CO6	3.00	

The above procedure of computing overall CO attainment is to be repeated for each course from first year to final year in an academic year in order to enable computation of PO and PSO attainment levels.

CO Attainment Target Value:

Attainment of COs is measured from the performance of students in cumulative internal examinations and from the course marks of the students in semester end examination. The overall pass percentage of the students is considered for CO attainment of that particular course.

The attainment is measured in terms of actual percentage of students getting set target marks.

The attainment target of CO is based on **60% cumulative internal examinations** as moderate level and **40% of semester end examination** as substantial level. **Hence the target value for the CO attainment is 2.4**

Attainment of Course Outcomes: (2017-2021 Batch)

Course Code	Semester	Name of the subject	Attainment (Grading Average on a scale of 3)
C111	1	16HS103 - Engineering Mathematics - I	2.82
C112	1	16HS102 - Engineering Physics	2.38
C113	1	16HS105 - Technical English Communication	2.81
C121	2	16HS108 - Engineering Mathematics - II	2.74
C122	2	16HS107 - Engineering Chemistry	2.88
C123	2	16ME101 - Engineering Graphics	3.00
C212	3	16EC202 - Electronic Devices and Circuits	2.90
C213	3	16EC203 - Network Theory	2.44
C214	3	16EC204 - Signals and Systems	2.97
C215	3	16EC205 - Digital Electronics	2.89
C216	3	16HS201 - Complex Variables and Transformations	2.38
C221	4	16EC206 - Probability Theory and Stochastic Processes	2.07
C311	5	16EC301 - Linear ICs and Applications	2.93
C317F	5	16MS301 - Managerial Economics	2.83
C321	6	16EC305 - Computer Architecture and Organization	2.84
C327A	6	16HS301 - Professional Ethics	2.71
C411	7	16CS306 - Computer Networks	2.95
C412	7	16EC401 - Optical Communication	2.78
C416D	7	16EC460 - Satellite Communication	2.91
C417A	7	16AE242 - Modern Vehicle Technology	2.77
		• • •	

		• •	
C421	8	16EC411 - Project Work	3.00
C422	8	16EC412 - Internship	3.00

b) PROGRAMME LEVEL ASSESSMENT:

Assessment of Programme Learning Outcomes and programme specific outcome through direct and indirect methods of assessment methodology/tools like comprehensive examination, rubrics, and surveys etc., are decided keeping in mind the parameters/learning outcomes to be measured and the desired emphasis during the delivery of a programme as prescribed in the course curriculum. PO – PSO Attainment Tools and Process is represented in Fig.2.

Assessment tools for POs and PSOs

- Assessment tools for POs and PSOs are categorized into two namely
 - i) Direct assessment method : 80%
 - ii) Indirect assessment method : 20%

i) Direct assessment method

Direct method helps to increase the student knowledge and skills based on the cumulative internal examinations and semester end examination.

The various assessment processes used to gather the data for evaluation of program outcomes and program specific outcomes are CO-PO mapping table and overall attainment of COs of each course and is shown in below Table1.

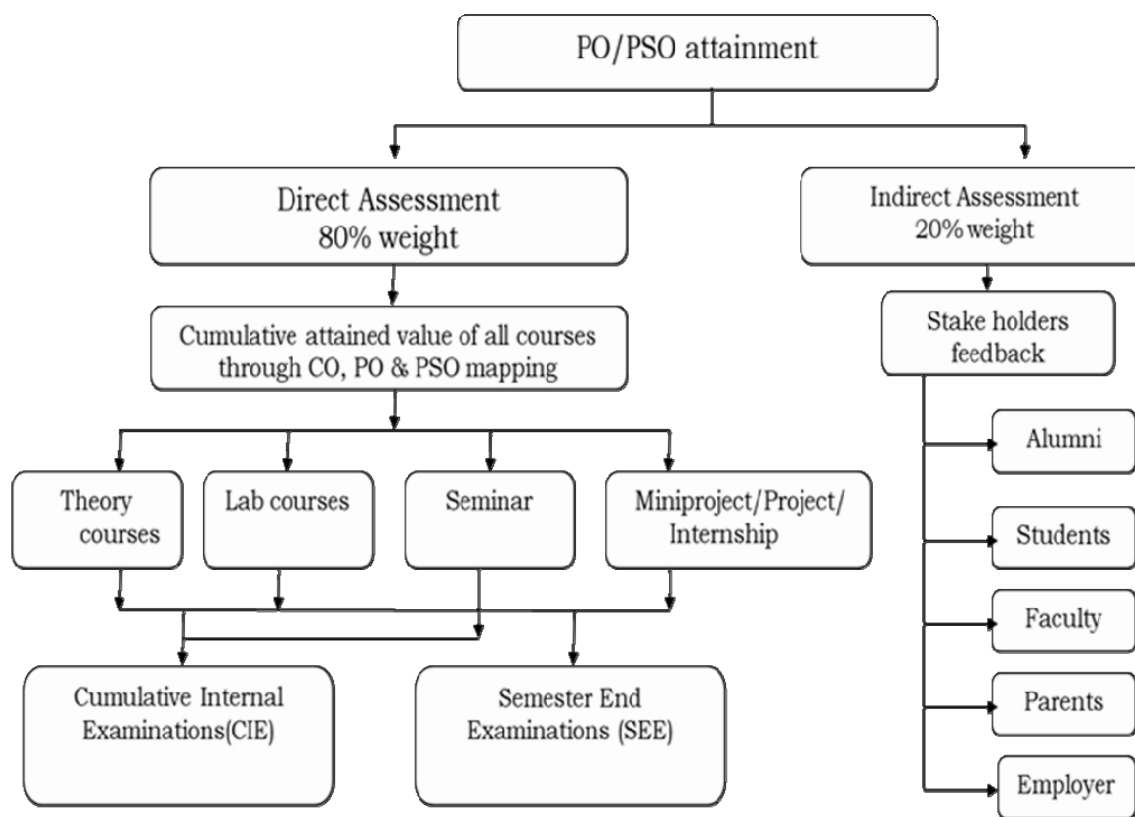


Figure: 2 PO – PSO Attainment Tools

Table.1 Data for direct assessment of PO-PSO

Assessment Method	Data	Source for data Collection
Direct Assessment (80%)	Internal Assessment of the Courses related to the respective PO-PSO	Average CO attainment level calculated
	University Assessment of the Courses related to the respective PO-PSO	

Direct assessment of POs and PSOs is calculated using the following procedure.

- CO-PO mapping table is considered for attainment.
- CO assessment is done by considering cumulative internal examinations and semester end examination marks. It is used to identify the level of COs attainment.
- The attained COs for a course is multiplied with the values of CO-PO mapping table and divided by mapped cells multiplied by the substantial correlation value.
- The formula of direct attainment of PO and PSO is

$$PO / PSO \text{ Direct attainment} = \frac{\text{Sum (Overall CO attainment} \times \text{PO/PSO score)}}{\text{mapped outcomes in PO/PSO \times A}}$$

- The obtained PO is compared with pre-defined PO target.

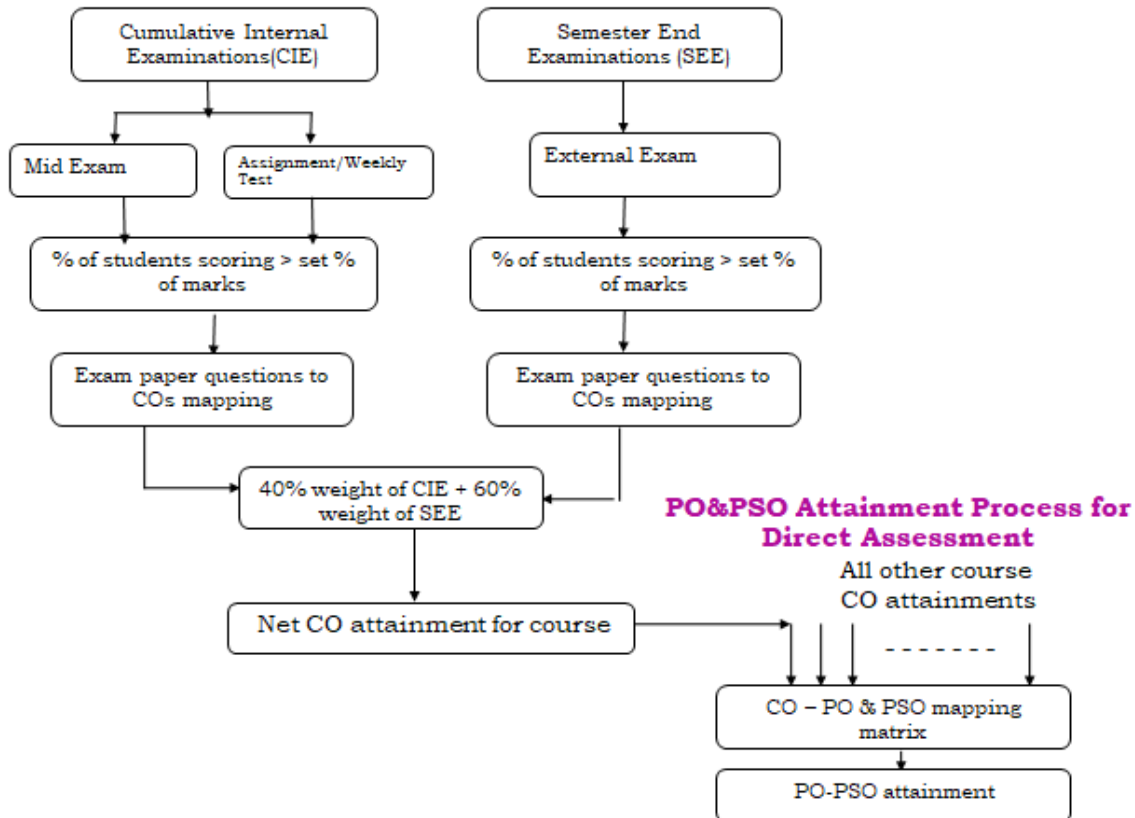


Figure: 3 PO – PSO Attainment Process

Assessment of Program Outcomes:

- The final assessment level of a particular program outcome is calculated from average of CO attainment through 60% of internal assessment and 40% end semester university examination. The following example illustrates the PO's & PSO's calculation for a course.

Step by step process of assessment of POs

Step 1: The program coordinator analyses each outcome into elements (different abilities specified in the outcome) and a set of attributes are defined for each element (actions that explicitly demonstrate mastery of the abilities specified), in addition, generate well designed surveys to assess the outcome.

Step 2: For each program outcome define performance indicators (Assessment criteria) and their target levels.

Step 3: Identify/select courses that address the outcome (each course contributes to at least one of the program outcome). Hence, each program outcome is assessed in several courses to ensure that students acquire an appropriate level in terms of knowledge/skills of an outcome.

Step 4: The program coordinators collect the qualitative and quantitative data and were used for outcome assessment in a continual process.

Step 5: The program monitoring and assessment committee analyse the collected data. If the assessed data meets the performance targets which are specified in step 2, then the program outcome is attained.

i) Direct attainment method of PO/PSO

The attainment of PO/PSOs process requires the attainment of COs and CO-PO-PSO mapping table (Course articulation matrix) for the course.

The CO attainment of a course and its CO-PO-PSO mapping tables are given below

Course Outcome	CO Final Attainment
CO 1	2.36
CO 2	2.04
CO 3	1.85
CO 4	2.16
CO 5	2.36

The CO-PO mapping table of a course is given below

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2			3								2	3
CO 2	2	3			2								3	2
CO 3	1	3			3								2	
CO 4	2	3											3	
CO 5	3	-											2	

PO₁ Direct Attainment

$$\frac{(\text{CO}_1 - \text{PO}_1)_{\text{Map}} (\text{CO}_1)_{\text{attn}} + (\text{CO}_2 - \text{PO}_1)_{\text{Map}} (\text{CO}_2)_{\text{attn}} + \dots + (\text{CO}_5 - \text{PO}_1)_{\text{Map}} (\text{CO}_5)_{\text{attn}}}{3 * (\text{Total No. of non - zero CO - PO}_1 \text{ Mappings)}}$$

For Example PO1 attainment for the above course is

PO₁ Direct Attainment

$$= \frac{(3) * (2.36) + (2) * (2.04) + (1) * (1.88) + (2) * (2.16) + (3) * (2.36)}{3 * 5}$$

$$= 2.63$$

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2			3								2	3
CO 2	2	3			2								3	2
CO 3	1	3			3								2	
CO 4	2	3											3	
CO 5	3												2	
PO Direct Attainment	2.63	1.52			1.11								1.71	0.74

We have to calculate for all the offered courses of the programme with the same procedure

Assessment of Program Outcomes/PSO:

- The final assessment level of a particular program outcome is calculated from average of CO attainment through 60% of internal assessment and 40% end semester university examination. The following example illustrates the PO's & PSO's calculation for a course.

Example for PO attainment:

PO attainment for the course C214 (16EC204 – Signals and Systems, 03 Semester ECE, F Section) is shown in below table

Course Code	Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
C214	16EC204 - Signals and Systems	2.5	2.8	2.0	2.0	2.1	-	-	-	2.0	2.0	2.0	1.5	3.0	-	-

PO attainment target value:

Levels	Performance quality
PO/PSO < 1	Does Not Meet Expectations
PO or PSO between 1 to 2	Marginal Expectations
PO or PSO >= 2	Meets Expectation

Attainment of Program Outcomes: (Example: 2017-2021 Batch)

Course	Semester	CourseName	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
C111	1	16HS103 - Engineering Mathematics - I	1.88	2.82			0.94							2.82			
C112	1	16HS102 - Engineering Physics	2.40	2.16	2.33				2.51								
C113	1	16HS105 - Technical English Communication							2.90	2.93	1.41	2.25		1.64			
C121	2	16HS108 - Engineering Mathematics - II	2.74	1.83			1.83							2.74			
C122	2	16HS107 - Engineering Chemistry	1.92	1.00			2.00		2.88								
C123	2	16ME101 - Engineering Graphics	3.00	2.00	2.00		3.00										
C212	3	16EC202 - Electronic Devices and Circuits	2.3	2.4	2.4	2.3	2.0				2.0	2.0	2.0	1.9	1.9		
C213	3	16EC203 - Network Theory	2.3	1.9	1.8	1.6									1.8	2.1	1.8
C214	3	16EC204 - Signals and Systems	2.5	2.8	2.0	2.0	2.1				2.0	2.0	2.0	1.5	3.0		
C215	3	16EC205 - Digital Electronics	2.4	2.3	2.9	2.2	2.5				2.0	2.0	2.0	3.0	2.3	2.6	2.4
•																	
•																	
•																	
•																	
•																	
C421	7/8	16EC411 - Project Work	2.2	1.8	2.0	2.2	2.2	2.0	2.3	2.2	2.1	2.0	3.0	2.4	3.0	3.0	3.0
C422	8	16EC412 - Internship	2.2	1.8	2.0	2.2	2.2	2.0	2.3	2.2	2.1	2.0	3.0	2.4	3.0	3.0	3.0
Direct Assessment			2.36	2.16	2.15	2.01	2.12	2.04	2.28	2.03	1.90	2.13	1.98	2.00	2.11	2.07	2.07
80% of Direct Assessment			1.89	1.73	1.72	1.61	1.70	1.63	1.82	1.62	1.52	1.70	1.58	1.60	1.69	1.66	1.66

INDIRECT ASSESSMENT METHOD

Indirect Assessment involves the qualitative method of obtaining the reflections of the stakeholders on the achievement of the program outcomes, through feedback mechanism. These methods provide clues about what could be assessed directly easy to administer particularly useful for ascertaining values and beliefs.

The stakeholders include Students, Alumni, Current faculty, Employers offering training (interns), Parents and Experts. An indirect assessment of student learning ascertains the perceived extent or value of learning experiences. They assess opinions or thoughts about student knowledge or skills. Indirect measures can provide information about student perception of their learning and how this learning is valued by different constituencies. An indirect assessment is useful in that it can be used to measure certain implicit qualities of student learning, such as values, perceptions, and attitudes, from a variety of perspectives.

Assessment tools used for indirect attainment of Pos and PSOs:

- a) Graduate Exit Survey: End of the program
- b) Parents Survey: End of the program
- c) Alumni Survey: After one year of graduation
- d) Employer Survey: After one year of graduation
- e) Faculty Survey: End of the program

a) Graduate Exit Survey

Following is the sample Graduate exit Survey form

Q. No.	Question	Agree (3)	Neutral (2)	Disagree (1)
1	Do you acquire enough engineering knowledge in the area of electrical and electronics engineering?			
2	Can you design and develop solutions to real world problems using your engineering knowledge?			
3	Can you use the modern tools like simulation software to provide engineering solutions?			
4	Is it possible by you to Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues			
5	Is your professional ethics improved through your engineering study?			

6	Can you function as a team and to co-ordinate the activities			
7	Is your oral and written communication improved because of soft skills related training programmes.			
8	Is your project management skill and handling the finance of the project improved because of the courses like Mini/Major project, Internships..			
9	Can you engage in independent and lifelong learning in the context of technological change.			
10	Have you been exposed to future technologies, which will provide smart solution?			

Question-PO/PSO Mapping:

Q.No	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
1	✓	✓											✓	✓
2			✓	✓									✓	✓
3		✓	✓	✓	✓	✓						✓	✓	✓
4						✓	✓						✓	✓
5								✓	✓				✓	✓
6								✓	✓	✓	✓	✓	✓	✓
7										✓		✓	✓	✓
8											✓	✓	✓	✓
9									✓			✓	✓	✓
10	✓	✓	✓	✓	✓				✓	✓			✓	✓
Total														

b) Parents Survey

Following is the sample parents Survey form

Sl. No.	Parameters	Good (3)	Satisfactory (2)	Poor (1)
1	How do you rate the courses in terms of their relevance to the latest and/or future technologies			
2	How do you feel about your ward's emotional connection towards parents, elders and society			
3	Did your ward got encouragement for participation in various co-curricular activities (say seminar, conference, guest lectures etc.)			
4	Your reaction about training and placement activities conducted			
5	Encouragement towards extra-curricular activities (sports etc.)			

6	How do you rate the overall personality development of your son / daughter during their 4 years of stay			
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Question-PO/PSO Mapping:

Q.No	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
1	✓	✓	✓	✓	✓			✓	✓	✓				
2						✓		✓	✓			✓		
3						✓	✓	✓	✓	✓	✓	✓		
4					✓				✓	✓	✓	✓		
5									✓	✓		✓		
6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Total														

c) Alumni Survey:

Following is the Alumni feedback form

Sl. No	Parameters	Good (3)	Satisfactory (2)	Poor (1)
1	How did you apply the basic science and engineering courses in understanding problems you solved so far in your carrier			
2	How did you use the technical knowledge acquired in electrical engineering for doing research in your organizations			
3	Rate your ability to design and develop system components and processes			
4	Rate your ability to develop and use new tools.			
5	Rate yourselves in factor of ethical, health, public, safety and environmental issues in the solutions developed by you			
6	Communication skills (level of acquisition during the program, usefulness in the job, additional acquisitions during work etc.)			
7	Extent of application of projects, management principles in the projects handled / being handled by you			
8	Enhancement of qualifications (higher degrees, certificate courses etc.), knowledge, skills etc. (workshops, training programs etc.)			

Question-PO/PSO Mapping:

Q.No	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
1	✓	✓										✓	✓	✓
2	✓	✓	✓	✓	✓			✓	✓			✓	✓	✓
3	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓	✓
4					✓				✓			✓	✓	✓
5						✓	✓	✓						
6									✓	✓		✓	✓	✓
7								✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓					✓		✓	✓	✓
Total														

d) Employer Survey

Following is the sample employer feedback form

Sl. No.	Parameters	Good (3)	Satisfactory (2)	Poor (1)
1	How do you find our student in applying the knowledge of mathematics, science in the solution of complying engineering problems			
2	How do you found our student with respect to technical skills			
3	How do you rate our students with respect to communication and interpersonal skills			
4	How do you rate our student with respect to being open to new ideas and learning new technologies			
5	How do you rate the capability of our student in the area of modern software tools usage			
6	How do you rate our student with respect to overall performance in terms of percentage contribution to your organization			

Question-PO/PSO Mapping:

Q.No	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
1	✓	✓	✓										✓	✓
2			✓	✓	✓								✓	✓
3						✓		✓	✓	✓	✓		✓	✓
4		✓	✓	✓	✓							✓	✓	✓
5		✓	✓	✓	✓							✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Total														

e) Faculty Survey

Following is the sample Faculty feedback form

Sl. No.	Parameters	Good (3)	Satisfactory (2)	Poor (1)
1	How do you find your student in applying the knowledge of mathematics, science in the solution of complying engineering problems			
2	How do you found your student with respect to technical skills			
3	How do you rate your students with respect to communication and interpersonal skills			
4	How do you rate your student with respect to being open to new ideas and learning new technologies			
5	How do you rate the capability of your student in the area of modern software tools usage			
6	How do you rate your student with respect to overall performance.			

Question-PO/PSO Mapping:

Q.No	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
1	✓	✓	✓										✓	✓
2			✓	✓	✓								✓	✓
3						✓		✓	✓	✓	✓		✓	✓
4		✓	✓	✓	✓							✓	✓	✓
5		✓	✓	✓	✓							✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Total														

Rubrics: Satisfaction level

>50% and <=60% = 1

>60% and <=80% = 2

>80% =3

Indirect POs/PSOs attainment process:

Indirect POs/PSOs attainment is calculated as follows

Step1: Calculate the average response of each question of the survey

Step2: The average response of the question is mapped to POs/PSOs in the Question-PO/PSO Mapping table.

Step3: Average of the each PO's attainment for the survey is calculated

Indirect Attainment (Example: 2017-21 batch)

Survey	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
20% of Indirect Attainment	0.56	0.56	0.56	0.56	0.56	0.57	0.59	0.57	0.56	0.57	0.56	0.57	0.59	0.59	0.59

Overall Attainment of Program Outcomes (Example: 2017-21 batch)

Overall Attainment of PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
80% of Direct Attainment	1.89	1.73	1.72	1.61	1.70	1.63	1.82	1.62	1.52	1.70	1.58	1.60	1.69	1.66	1.66
20% of Indirect Attainment	0.56	0.56	0.56	0.56	0.56	0.57	0.59	0.57	0.56	0.57	0.56	0.57	0.59	0.59	0.59
Overall Attainment	2.45	2.29	2.28	2.17	2.26	2.21	2.41	2.19	2.08	2.27	2.15	2.17	2.24	2.22	2.18

PROCEDURE TO VALIDATE THE POs and PSOs

STEP 1: Outline the Program Specific Outcomes (PSOs).

STEP 2: Outline the Course Outcomes (COs) of Each Courses.

STEP 3: Establish Correlation Between COs-POs-PSOs.

STEP 4: Define the Rubrics to Validate POs and PSOs.

STEP 5: Define the Target Attainment Levels of POs and PSOs.

STEP 6: Estimate the Attainment of POs and PSOs through Direct and Indirect Methods.

STEP 7: Compare the Attainment of POs and PSOs with Target Level.

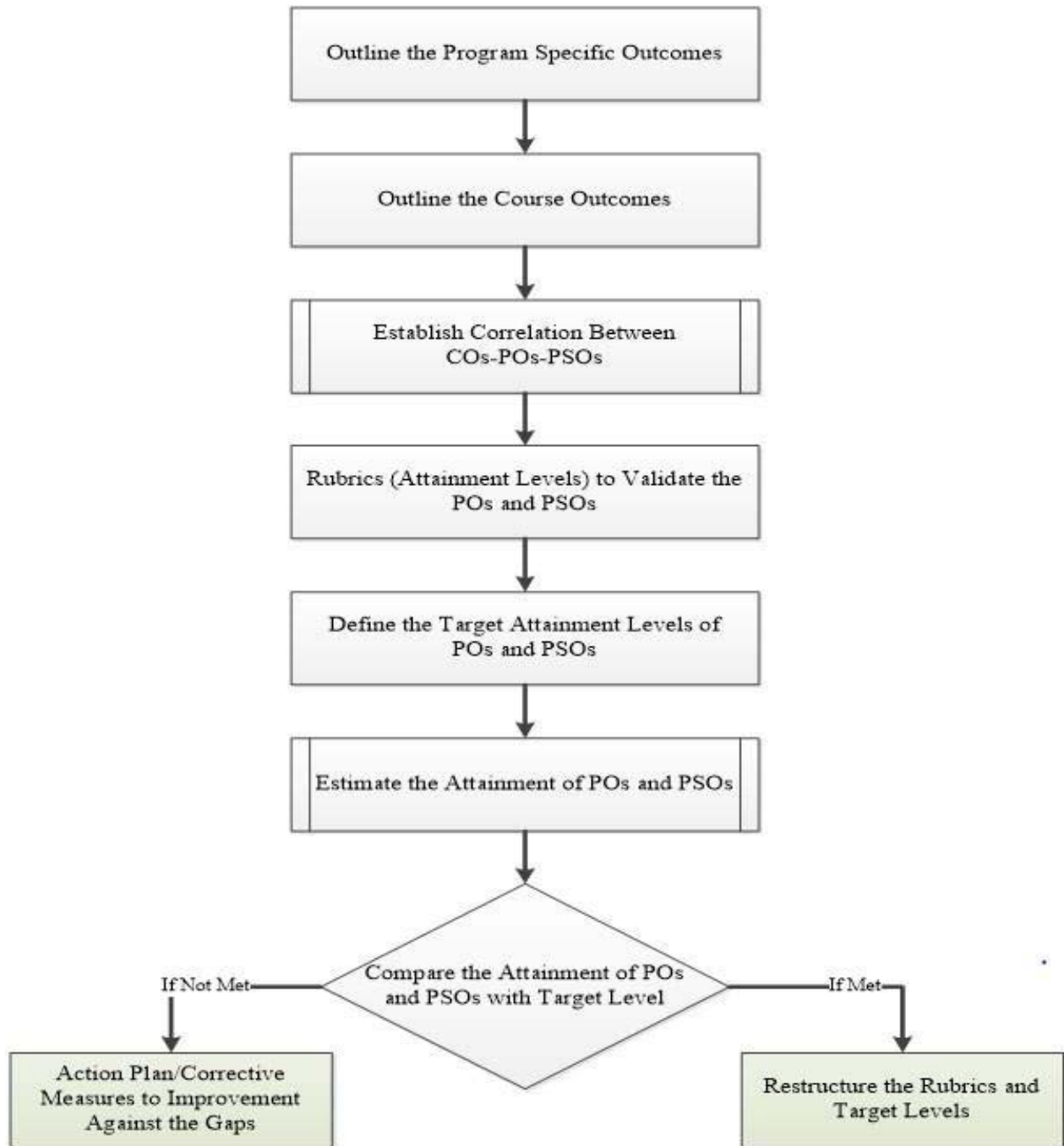


Figure. Process of Validate the POs and PSOs

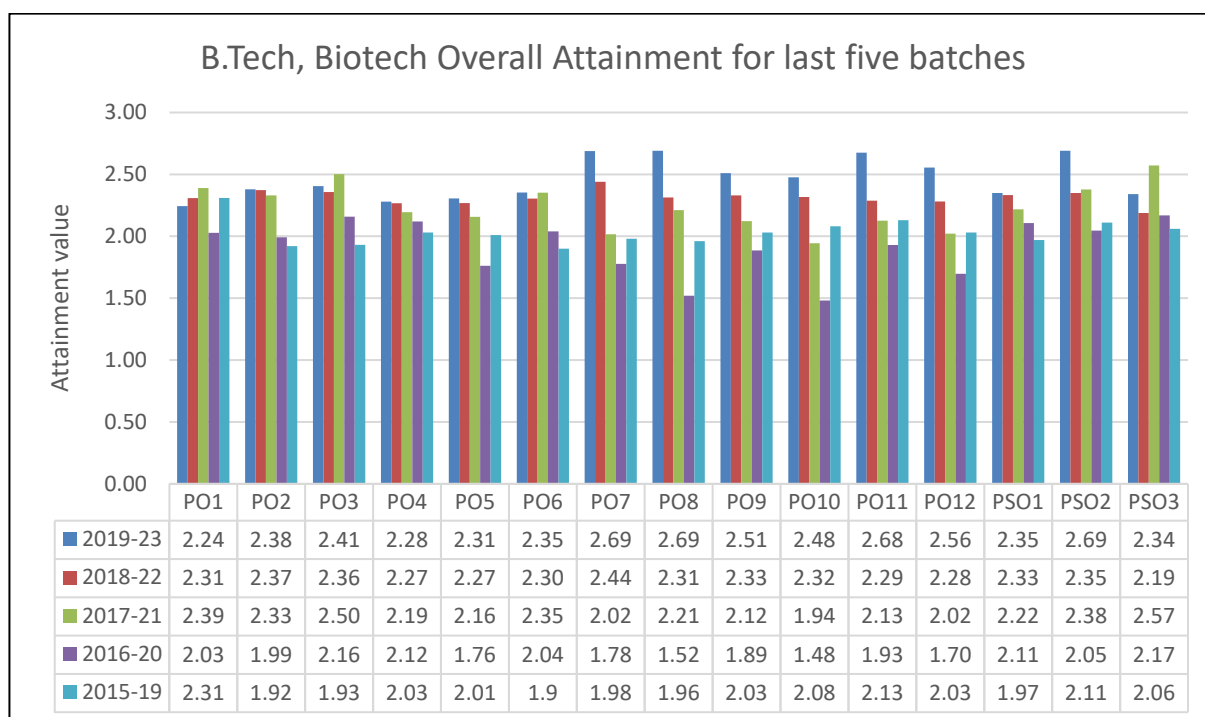
CONTINUOUS IMPOROVEMENT ASSESSMENT SUMMARY

BASED ON ACTION PLAN (Last Five Batches)

The Department Advisory committee of Biotechnology gathers all consolidated results from the program faculty. The DAC makes assessment to improve the CO-PO attainment by suggesting plan of action for departmental outcomes improvements based on the assessment data. Action plans resulting from this assessment are discussed at department level and the inputs are also given to CDMC depending upon the action plan.

The attainment levels of five batches are improved from batch to batch. For 2015 – 2019 batch (R13 regulation) target value was taken as 2.0 (66%). For 2016-2020 batch (R16 regulation) target value was taken as 2.1 (70%). For 2017-2021 batch target value was taken as 2.25(75%). For 2018-2022 batch target value was taken as 2.4(80%). And finally for 2019 – 2023 batch target value was taken as 2.5 (83%).

PO-PSO attainments of Biotechnology



Overall Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
2019-23	2.24	2.38	2.41	2.28	2.31	2.35	2.69	2.69	2.51	2.48	2.68	2.56	2.35	2.69	2.34
															Attainment Range: 2.24-2.69
2018-22	2.31	2.37	2.36	2.27	2.27	2.30	2.44	2.31	2.33	2.32	2.29	2.28	2.33	2.35	2.19
															Attainment Range: 2.19-2.44
2017-21	2.39	2.33	2.50	2.19	2.16	2.35	2.02	2.21	2.12	1.94	2.13	2.02	2.22	2.38	2.57
															Attainment Range: 1.94-2.57
2016-20	2.03	1.99	2.16	2.12	1.76	2.04	1.78	1.52	1.89	1.48	1.93	1.70	2.11	2.05	2.17
															Attainment Range: 1.48-2.16
2015-19	2.31	1.92	1.93	2.03	2.01	1.9	1.98	1.96	2.03	2.08	2.13	2.03	1.97	2.11	2.06
															Attainment Range: 1.92-2.31

Identification of Attainment Gaps

The Measurement of attainment of program outcomes is an important tool which provides a benchmark to visualize how an institution is succeeded towards its vision. The PO- PSO direct attainment is computed by considering the course outcomes attainment values of all courses. The PO-PSO indirect attainment is computed by considering all stack-holders feedback. Attainment of a PO-PSO depends on the attainment levels of associated COs and the strength to which it is mapped. Once the attainment is completed with the set target value.

For R13 curriculum 2015 – 2019 batch the set target value was 2.0 (66%) and for R16 curriculum from 2016-2020, 2017-2021, 2018 – 2022 and 2019 - 2023 batches, the set target value was 2.1, 2.25, 2.4 and 2.5(70%, 75%, 80% and 83% of substantial value 3). The study on the PO attainment values shows that most of the POs and PSOs achieved more than the targeted score for a scale of 3. This success advocates department continuous effort to provide Engineering curriculum in-lined with Vision of the department and the Vision of the institute. Although the assessment tool seems to be viable, the department is still working to standardize CO statements, and also considers the suggestion given by the course handled faculty.

The department reviews the overall attainment of POs-PSOs and identifies the courses related to a particular PO-PSO that need to be addressed and helps to identify the PO-PSOs gap attainment by the concerned faculty.

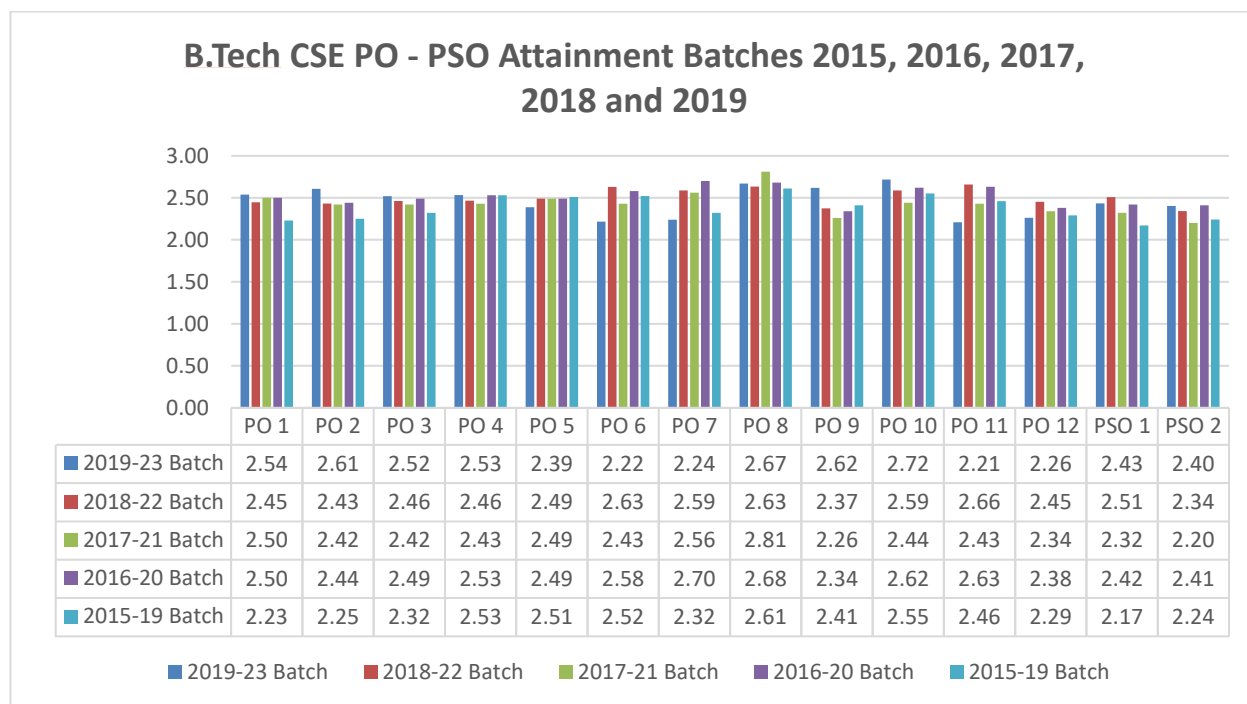
Computer Science and Engineering

The Department Advisory committee of Computer Science and Engineering gathers all consolidated tabulated results from the program faculty. The DAC makes assessment to improve the CO-PO attainment by suggesting plan of action for departmental outcomes improvements based on the assessment data. Action plans resulting from this assessment are discussed at department level and the inputs are also given to CDMC depending upon the action plan.

The attainment levels of five batches are improved from batch to batch. For 2015 – 2019 batch (R13 regulation) target value was taken as 2.0 (66%). For 2016-2020 batch (R16 regulation) target value was taken as 2.1 (70%). For 2017-2021 batch target value was taken as 2.25(75%). For 2018-2022 batch target

value was taken as 2.4(80%). And finally for 2019 – 2023 batch target value was taken as 2.5 (83%).

PO-PSO attainment of CSE



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	PSO 1	PSO 2
2019-23 Batch	2.54	2.61	2.52	2.53	2.39	2.22	2.24	2.67	2.62	2.72	2.21	2.26	2.43	2.40
2018-22 Batch	2.45	2.43	2.46	2.46	2.49	2.63	2.59	2.63	2.37	2.59	2.66	2.45	2.51	2.34
	Attainment Range: 2.21 to 2.72													
2017-21 Batch	2.50	2.42	2.42	2.43	2.49	2.43	2.56	2.81	2.26	2.44	2.43	2.34	2.32	2.20
2016-20 Batch	2.50	2.44	2.49	2.53	2.49	2.58	2.70	2.68	2.34	2.62	2.63	2.38	2.42	2.41
	Attainment Range: 2.20 to 2.81													
2015-19 Batch	2.23	2.25	2.32	2.53	2.51	2.52	2.32	2.61	2.41	2.55	2.46	2.29	2.17	2.24
	Attainment Range : 2.17 to 2.61													

Identification of Attainment Gaps

The Measurement of attainment of program outcomes is an important tool which provides a benchmark to visualize how an institution is succeeded towards its vision. The PO- PSO direct attainment is computed by considering the course outcomes attainment values of all courses. The PO-PSO indirect attainment is computed by considering all stack-holders feedback. Attainment of a PO-PSO depends on the attainment levels of associated COs and the strength to which it is mapped. Once the attainment is completed with the set target value.

For R13 curriculum 2015 – 2019 batch the set target value was 2.0 (66%) and for R16 curriculum from 2016-2020, 2017-2021, 2018 – 2022 and 2019 - 2023 batches, the set target value was 2.1, 2.25, 2.4 and 2.5(70%, 75%, 80% and 83% of substantial value 3). The study on the PO attainment values shows that

most of the POs and PSOs achieved more than the targeted score for a scale of 3. This success advocates department continuous effort to provide Engineering curriculum in-lined with Vision of the department and the Vision of the institute. Although the assessment tool seems to be viable, the department is still working to standardize CO statements, and also considers the suggestion given by the course handled faculty.

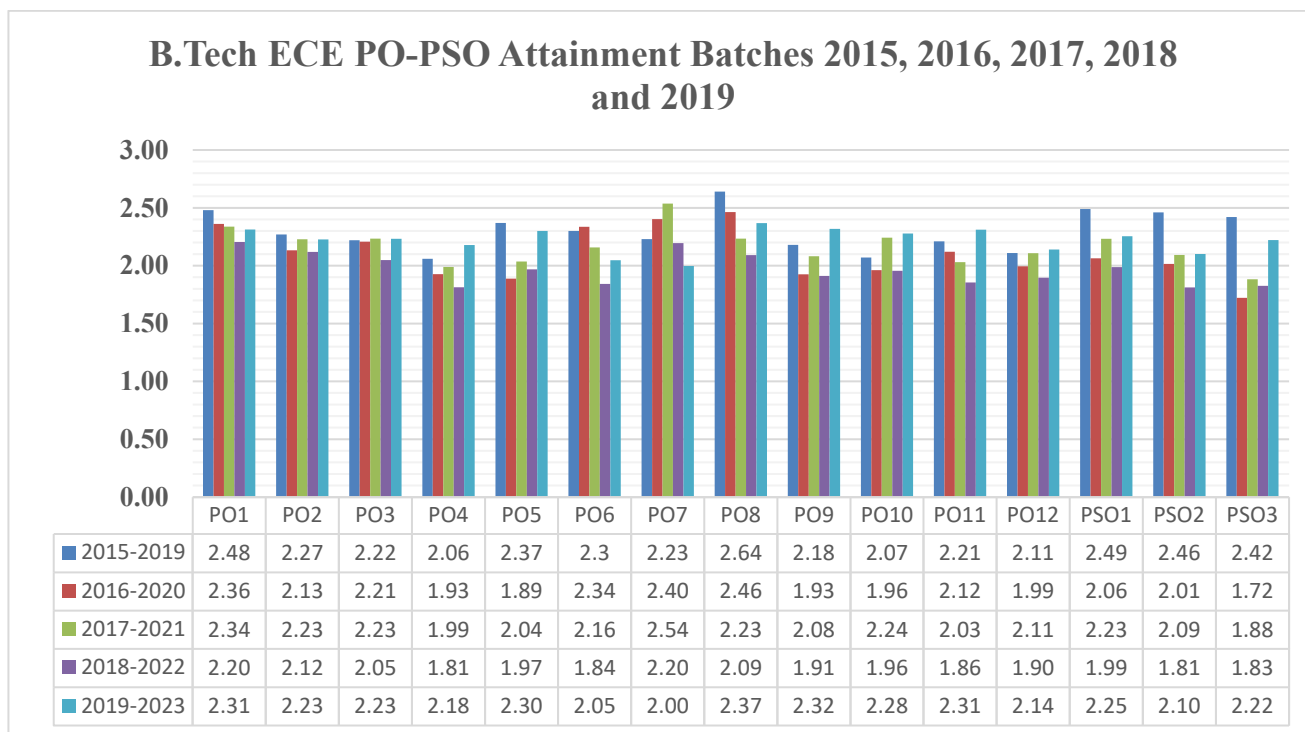
The department reviews the overall attainment of POs-PSOs and identifies the courses related to a particular PO-PSO that need to be addressed and helps to identify the PO-PSOs gap attainment by the concerned faculty.

Electronics and Communication Engineering

The Department Advisory committee of Electronics and Communication Engineering gathers all consolidated tabulated results from the program faculty. The DAC makes assessment to improve the CO-PO attainment by suggesting plan of action for departmental outcomes improvements based on the assessment data. Action plans resulting from this assessment are discussed at department level and the inputs are also given to CDMC depending upon the action plan.

The attainment levels of Five batches are improved from batch to batch. For 2015-2019 batch (R13 regulation) target value was taken as 2.0 (66%). For 2016-2020 batch (R16 regulation) target value was taken as 2.0 (66%). For 2017-2021 batch target value was taken as 2.10 (70%), For 2018-2022 batch target value was taken as 2.10 (70%) and finally for 2019 -2023 batch (R19 regulation) target value was taken as 2.2 (73%).

PO-PSO attainment of ECE



Overall Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
2015-2019 Batch	2.48	2.27	2.22	2.06	2.37	2.3	2.23	2.64	2.18	2.07	2.21	2.11	2.49	2.46	2.42
Attainment range : 2.07 to 2.64															
2016-2020 Batch	2.36	2.13	2.21	1.93	1.89	2.34	2.40	2.46	1.93	1.96	2.12	1.99	2.06	2.01	1.72
Attainment range : 1.72 to 2.46															
2017-2021 Batch	2.34	2.23	2.23	1.99	2.04	2.16	2.54	2.23	2.08	2.24	2.03	2.11	2.23	2.09	1.88
Attainment range : 1.88 to 2.54															
2018-2022 Batch	2.20	2.12	2.05	1.81	1.97	1.84	2.20	2.09	1.91	1.96	1.86	1.90	1.99	1.81	1.83
Attainment range : 1.81 to 2.20															
2019-2023 Batch	2.31	2.23	2.23	2.18	2.30	2.05	2.00	2.37	2.32	2.28	2.31	2.14	2.25	2.10	2.22
Attainment range : 2.05 to 2.37															

IDENTIFICATION OF ATTAINMENT GAPS

The Measurement of attainment of program outcomes is an important tool which provides a benchmark to visualize how an institution is succeeded towards its vision. The PO- PSO direct attainment is computed by considering the course outcomes attainment values of all courses. The PO-PSO indirect attainment is computed by considering all stockholder's feedback.

Attainment of a PO-PSO depends on the attainment levels of associated COs and the strength to which it is mapped. Once the attainment is completed with the set target value.

For R13 curriculum from 2015-2019 batch, the set target value was 2.0 (66%), and for R16 curriculum from 2016-2020, 2017-2021, 2018-2022 and 2019-2023 batches, the set target value was 2.00, 2.1, 2.1, and 2.2 (66%, 70%, 70% and 73% of substantial value 3).

The study on the PO attainment values shows that all POs and PSOs achieved more than the targeted score for a scale of 3. This success advocates department continuous effort to provide Engineering curriculum in-lined with Vision of the department and the Vision of the institute.

Although the assessment tool seems to be viable, the department is still working to standardize CO statements, and also considers the suggestion given by the course handled faculty.

The department reviews the overall attainment of POs-PSOs and identifies the courses related to a particular PO-PSO that need to be addressed and helps to identify the PO-PSOs gap attainment by the concerned faculty.

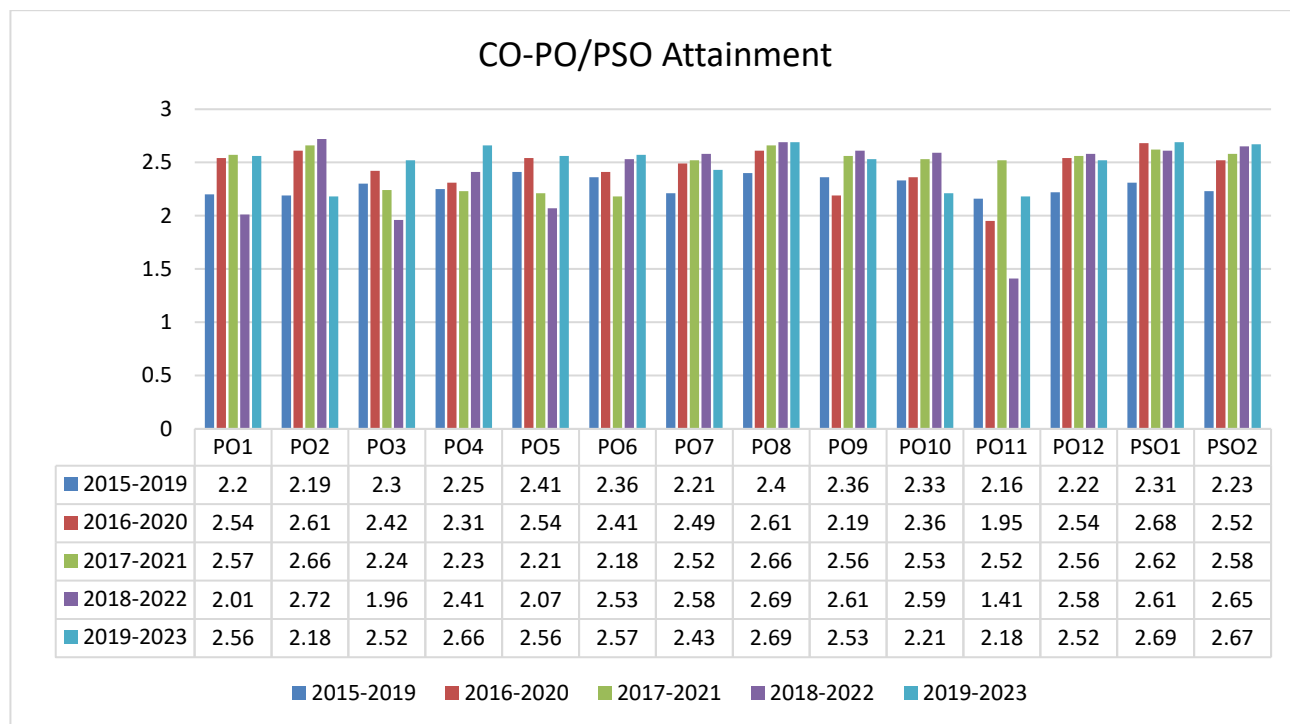
Electrical and Electronics Engineering

The Department Advisory committee of Electrical and Electronics Engineering gathers all consolidated tabulated results from the program faculty. The DAC makes assessment to improve the CO-PO attainment by suggesting plan of action for departmental outcomes improvements based on the assessment data. Action plans resulting from this assessment are discussed at department level and the inputs are also given to CDMC depending upon the action plan.

The attainment levels of Five batches are improved from batch to batch. For 2015-2019 batch (R13 regulation) target value was taken as 2.0 (66%). For 2016-2020 batch (R16 regulation) target value was taken as 2.0 (66%). For 2017-2021 batch target value was taken as 2.10 (70%), For 2018-2022 batch target value was taken as 2.10 (70%) and

finally for 2019 -2023 batch (R19 regulation) target value was taken as 2.2 (73%).

PO-PSO attainment of EEE



Overall Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
2019-2023	2.56	2.18	2.52	2.66	2.56	2.57	2.43	2.69	2.53	2.21	2.18	2.52	2.69	2.67
Attainment Range : 2.18 to 2.69														
2018-2022	2.01	2.72	1.96	2.41	2.07	2.53	2.58	2.69	2.61	2.59	1.41	2.58	2.61	2.65
Attainment Range : 1.41 to 2.72														
2017-2021	2.57	2.66	2.24	2.23	2.21	2.18	2.52	2.66	2.56	2.53	2.52	2.56	2.62	2.58
Attainment Range : 2.21 to 2.66														
2016-2020	2.54	2.61	2.42	2.31	2.54	2.41	2.49	2.61	2.19	2.36	1.95	2.54	2.68	2.52
Attainment Range : 1.95 to 2.68														
2015-2019	2.2	2.19	2.3	2.25	2.41	2.36	2.21	2.4	2.36	2.33	2.16	2.22	2.31	2.23
Attainment Range : 2.16 to 2.41														

IDENTIFICATION OF ATTAINMENT GAPS

The Measurement of attainment of program outcomes is an important tool which provides a benchmark to visualize how an institution is succeeded towards its vision. The PO- PSO direct attainment is computed by considering the course outcomes attainment values of all courses. The PO-PSO indirect attainment is computed by considering all stockholder’s feedback.

Attainment of a PO-PSO depends on the attainment levels of associated COs and the strength to which it is mapped. Once the attainment is completed with the set target value.

For R13 curriculum from 2015-2019 batch, the set target value was 2.0 (66%), and for R16 curriculum from 2016-2020, 2017-2021, 2018-2022 and 2019-2023 batches, the set target value was 2.00, 2.1, 2.1, and 2.2 (66%, 70%, 70% and 73% of substantial value 3).

The study on the PO attainment values shows that all POs and PSOs achieved more than the targeted score for a scale of 3. This success advocates department continuous effort to provide Engineering curriculum in-lined with Vision of the department and the Vision of the institute.

Although the assessment tool seems to be viable, the department is still working to standardize CO statements, and also considers the suggestion given by the course handled faculty.

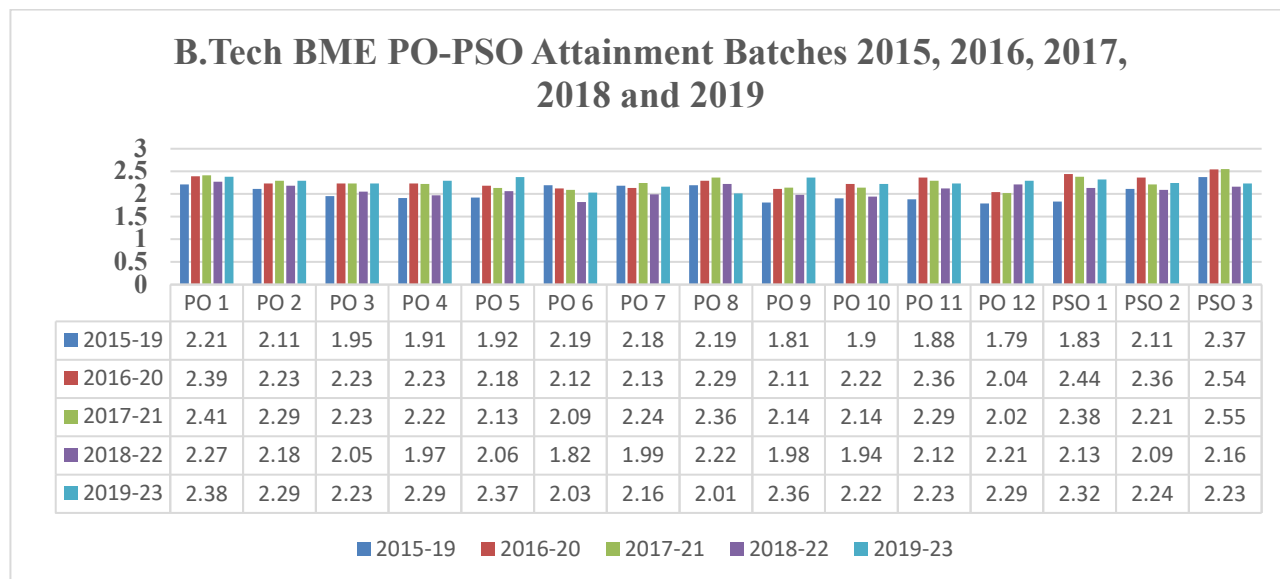
The department reviews the overall attainment of POs-PSOs and identifies the courses related to a particular PO-PSO that need to be addressed and helps to identify the PO-PSOs gap attainment by the concerned faculty.

Biomedical Engineering

The Department Advisory committee of Biomedical Engineering gathers all consolidated tabulated results from the program faculty. The DAC makes assessment to improve the CO-PO attainment by suggesting plan of action for departmental outcomes improvements based on the assessment data. Action plans resulting from this assessment are discussed at department level and the inputs are also given to CDMC depending upon the action plan.

The attainment levels of Five batches are improved from batch to batch. For 2015-2019 batch (R13 regulation) target value was taken as 1.80 (60%). For 2016-2020 batch (R16 regulation) target value was taken as 1.88 (63%). For 2017-2021 batch target value was taken as 1.95 (65%), For 2018-2022 batch target value was taken as 2.05 (68%) and finally for 2019 -2023 batch (R19 regulation) target value was taken as 2.10 (70%).

PO-PSO attainment of BME



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	PSO 1	PSO 2	PSO 3
2015-2019 Batch	2.21	2.11	1.95	1.91	1.92	2.19	2.18	2.19	1.81	1.9	1.88	1.79	1.83	2.11	2.37
Attainment range: 1.79 to 2.37															
2016-2020 Batch	2.39	2.23	2.23	2.23	2.18	2.12	2.13	2.29	2.11	2.22	2.36	2.04	2.44	2.36	2.54
Attainment range: 2.04 to 2.54															
2017-2021 Batch	2.41	2.29	2.23	2.22	2.13	2.09	2.24	2.36	2.14	2.14	2.29	2.02	2.38	2.21	2.55
Attainment range: 2.02 to 2.55															
2018-2022 Batch	2.27	2.18	2.05	1.97	2.06	1.82	1.99	2.22	1.98	1.94	2.12	2.21	2.13	2.09	2.16
Attainment range: 1.82 to 2.27															
2019-2023 Batch	2.38	2.29	2.23	2.29	2.37	2.03	2.16	2.01	2.36	2.22	2.23	2.29	2.32	2.24	2.23
Attainment range: 2.01 to 2.38															

IDENTIFICATION OF ATTAINMENT GAPS

The Measurement of attainment of program outcomes is an important tool which provides a benchmark to visualize how an institution is succeeded towards its vision. The PO- PSO direct attainment is computed by considering the course outcomes attainment values of all courses. The PO-PSO indirect attainment is computed by considering all stockholder's feedback.

Attainment of a PO-PSO depends on the attainment levels of associated COs and the strength to which it is mapped. Once the attainment is completed with the set target value.

For R13 curriculum from 2015-2019 batch, the set target value was 1.80 (60%), and for R16 curriculum from 2016-2020, 2017-2021, 2018-2022 and 2019-2023 batches, the set target value was 1.88, 1.95, 2.05, and 2.10 (63%, 65%, 68% and 70% of substantial value 3).

The study on the PO attainment values shows that all POs and PSOs achieved more than the targeted score for a scale of 3. This success advocates department continuous effort to provide Engineering curriculum in-lined with Vision of the department and the Vision of the institute.

Although the assessment tool seems to be viable, the department is still working to standardize CO statements, and also considers the suggestion given by the course handled faculty.

The department reviews the overall attainment of POs-PSOs and identifies the courses related to a particular PO-PSO that need to be addressed and helps to identify the PO-PSOs gap attainment by the concerned faculty.

PRACTICES TO IMPROVE THE PO AND PSO ATTAINMENT

To improve the PO and PSOs, we adapted and practiced the following activities -

- Academic activities
- Professional activities

Academic activities enforced to improve the attainment of PO and PSOs from

In addition to the teaching and learning practices, the following are adopted:

- Increase in the attendance cut off from 75% to 80%
- Consideration of all three mid-term examinations.
- Introduction of Periodic Assignments / Tests in CIE and projects.
- Introduction of Continuous Laboratory Assessment in Laboratory Courses.
- Incorporate problem-solving exercises that mimic real-world challenges

Professional activities enforced to improve the attainment of POs and PSOs

Students are motivated and encouraged to participate in

- On-line courses offered via NPTEL, EDX, Coursera etc.
- Provide training on relevant software and tools
- Participate in Co-curricular and Extra-Curricular activities by giving them OD facility
- Participate in SAC & E-Cell activities
- Effective Counselling and mentoring
- Establish a feedback mechanism where students can provide input on the effectiveness of the learning methods