CO & PO Attainment and Assessment Manual

2020

Gokaraju Rangaraju

Institute of Engineering and Technology

(Autonomous)

Bachupally, Kukatpally, Hyderabad – 500 090, Telangana, India

CONTENTS

APPENDICES

CO & PO ATTAINMENT AND ASSESSMENT MANUAL

1. Outcome Based Education Implementation Process

Outcome Based Education (OBE) implementation process is summarised in the following figures.

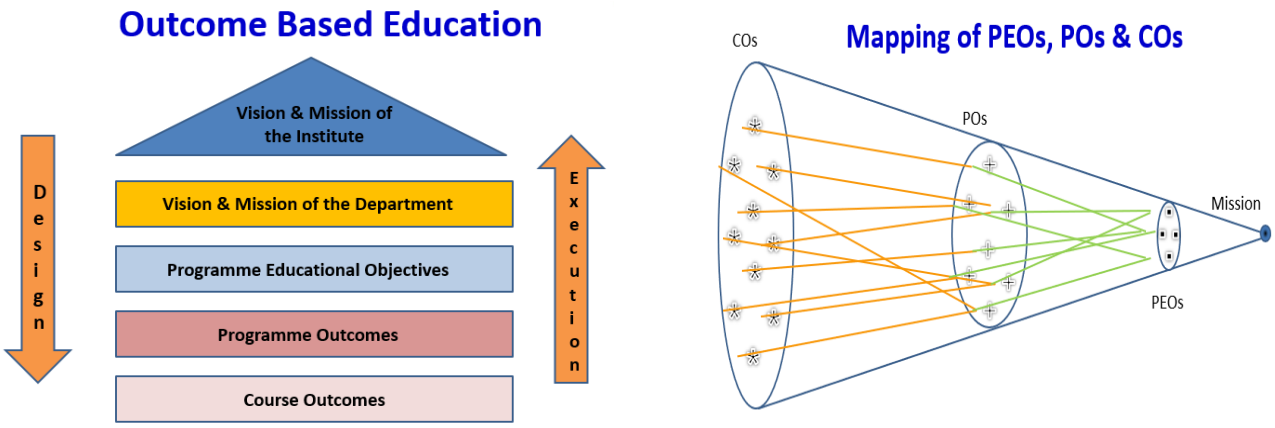

Figure 1: OBE and Mapping of PEOs, POs and COs

2. Vision & Mission of the Institute

Vision

To be among the best of the institutions for engineers and technologists with attitudes, skills and knowledge and to become an epicentre of creative solutions.

Mission

To achieve and impart quality education with an emphasis on practical skills and social relevance.

Quality Policy

To provide an integrated learning environment to enable students to grow towards their full potential and meet the high expectations of the Industry and the Society.

3. Vision & Mission of the Department

The department established the vision and mission through a consultative process involving the stakeholders like students, alumni, parents, professional bodies, faculty, industry, management, etc. considering the scope for growth of the department and future societal requirements.

The process for defining Vision and Mission of the department is as follows:

- This process reviews aspirations of our Institution in the light of the vision and mission of some of best educational institutions running similar programmes.

- Feedback from all stakeholders are considered
- Departmental Advisory Board (DAB)/Departmental Development and Monitoring Committee (DDMC) makes the draft.
- These proposals are ratified by the Governing Body.

Figure 2: The process for defining the Mission and Vision of the department

4. Programme Educational Objectives

PEOs are the expected achievements of graduates in their career. They are expected to perform and achieve during the first few years after graduation. Every programme is to prepare graduates to accomplish after 3 to 5 years of graduation. These must be realistic and attainable which addresses needs of the stakeholders.

Institute makes every effort to ensure Department PEOs are communicated effectively to all stakeholders namely students, faculty, parents, industry, alumni and management and are published and disseminated through Departmental brochure/booklets, Course Registers**,** College/Departmental Website, Display Monitors, Notice Boards**,** Orientation Programmes to freshers /parents, Induction Programmes to staff members, etc.

List the stakeholders of the programme are as follows.

Students: Students seek quality environment at the Institute which includes good infrastructure, qualified faculty and conducive learning environment. They expect the qualification to be well recognized for an employment with reputed industry or for admission in the best educational institution or to prepare for a career of one's own choice. Students play a key role in program enhancement. Feedback given by students help in redesigning the curriculum and in introducing new innovative practices to meet the industry needs.

Employer: The employer looks for recruiting the students from the institution who can be trained easily, deployed rapidly and contribute for Organizational and societal growth. Industry also sees institutions as a complementary asset to their R&D. They are being one of the direct beneficiaries, provide the necessary direction and growth plans. The feedback from the employer helps to fill the curriculum gaps to meet the current trends.

Faculty: Faculty acts as facilitator for the students to achieve their goals. Faculty play important role in guiding the students and motivating them. Faculty wants to improve their credentials and growth in profession. Faculty takes pride in associating with a reputed institution and builds their career. They also play a crucial role in designing the programme and establishing the PEOs / POs. The consistency of the programme is maintained by different committees formed by the faculty.

Parents: Parents seek quality education for their ward for a better future and career through the institution. Parents' expectations are also given consideration in the development of curriculum.

Alumni: The Alumni take pride in their educational institution from where they graduated. The Alumni prefer to maintain traditions by guiding their juniors on approaches to get better professional growth. The present social networking sites have made better interaction between Alumni and students. The Alumni contributes to the institution at times financially and other times through technical guidance and gives feedback for the development of the Institution. Alumni feedback is more important in redesigning the course content because they faced the field problem with the knowledge imparted during their education. They can judge whether the level of knowledge they have gained is at par with industry requirements or not.

Management: The Management is a facilitator for imparting quality education by providing best infrastructure, qualified faculty members and latest equipment and software. Management also focuses on the professional growth of the students. Management can enhance their social standing through the institution.

Professional Bodies: Professional bodies are groups of experienced professionals with lots of experience in their respective profession. They have knowledge of the latest developments in the field and what skills the young engineers should have to flourish in their career. The opinions of professional bodies are given due consideration.

We draw upon the inputs from stake holders typically the faculty, alumni, industry, professional bodies input to formulate our PEOs.The PEOs are established through the following steps.

- Vision and Mission of the Institute and Department are taken as the basis to interact with all the key stake holders.
- All documents relating to the Programme and the department are also forms the necessary inputs. These include instructional materials which are collected for all the courses. The Outcomes in terms of courses are listed for the programme and the Graduate attributes are considered apart from information collected from Alumni in terms of career achievements, contribution to society, ethical practices and intellectual contributions.
- Program Coordinator consults the key stakeholders in the light of current status of the institute, teaching learning environment, student and faculty quality and infrastructure. Feedback from prospective employers and current employers of alumni are collected.
- Programme Assessment Committee reviews and recommends within the guidelines defined for the formulation of the PEOs to DAB (DDMC).
- DAB (DDMC) finalizes the PEOs and submits to Academic Council.
- PEOs suggested by DAB (DDMC) are ratified by the Academic Council.

Figure 3: The process of establishing PEOs

For example, PEOs of B.Tech Civil Engineering programme is meant to prepare the students to professionally thrive and to lead during their progression.

PEO 1: Graduates of the programme will be successful in technical and professional career.

PEO 2: Graduates of the programme will have proficiency in execution of real time Civil Engineering projects.

PEO 3: Graduates of the programme will continue to engage in life-long learning with ethical and social responsibility.

The department mission is in consistence with that of the institute. The PEOs are consistent with the mission of department as described by mapping wherein it gives evidence on the agreement between mission and the PEOs. The B.Tech Civil Engineering PEOs reflect the expected accomplishments of the

graduates a few years after their graduation. These objectives are consistent with the Mission statement as is evident from the statement above. PEOs (Program Educational Objectives) relate to the career and professional accomplishments of students after they graduate from the program. Consequently, assessment and evaluation of the objectives requires assessment tools that can be applied after graduation. The PEO's assessment process and methods are tabulated.

S.No.	Method	Assessment Tool	Description
1	Direct	Oral & Written Exams	Objective, subjective, theory, practical, seminar and viva evaluation
2		Projects	Mini & Major project evaluation
3	Indirect	Student Exit Survey	Passing out students
4		Alumni Survey	Old batches of the students
5		Employer Survey	Industries which recruit our students
6		Industry Survey	Leading industry in the domain of programme

The PEOs have been defined based on the vision and mission of institution and the department. The curriculum is developed based on these PEOs and uses the feedback received from the stakeholders through surveys. The continuous process of assignments, direct and indirect assessments and evaluation will lead to the revision and refinement of the PEOs. A mechanism is provided to review the results of the evaluation of outcome based education system at the end of each academic year.

5. Programme Outcomes

Programme Outcomes are defined based on the Graduate Attributes. Institute makes every effort to ensure Department POs are communicated effectively to all stakeholders namely students, faculty, parents, industry, alumni and management. POs are published and disseminated through departmental Brochure / Booklets, Course Registers, College / Departmental Website, Display Monitors, Notice Boards, Orientation Programme to freshers/parents, Induction Programme to staff members, presentations to visiting academicians, industry personnel, parents etc.

POs are as defined and developed for each program with the consultation and involvement of various stakeholders from management, industry, alumni, faculty, and students. Their interests, suggestions and contributions in defining and developing the POs are considered. The programme assessment committee formulates the programme outcomes after considering the views of all stakeholders and the PEOs. This is forwarded to DAB (DDMC) for its recommendations and submission to Academic

council. The programme outcomes are approved by Academic council. The process is presented in the flow chart given below.

Figure 4: Process for Defining POs

The following are the graduate attributes prescribed by the NBA

- Engineering knowledge
- Problem analysis
- Design/Development of solutions
- Conduct investigation of complex problems
- Modern tool usage
- The engineer and society
- Environment and sustainability

- Ethics
- Individual and teamwork
- Communication
- Project management and finance
- Life- long learning

Graduate Attributes	Programme Outcomes											
	a	b	C	D	E	f	g	h	i	j	K	L
Engineering Knowledge	X											
Problem Analysis		X										
Design/Development of Solutions			X									
Conduct investigations of complex problems				X								
Modern Tool Usage					X							
The engineer and society						X						
Environment and Sustainability							X					
Ethics								X				
Individual and Teamwork									X			
Communication										X		
Project Management and Finance											X	
Life Long Learning												X

5.1 Programme Specific Outcomes (PSOs)

PSOs are the outcomes which are specific to a program in addition to the Program Outcomes. PSOs outline about the expectations of the students to identify and ability to do in a specific area of discipline upon graduation from a programme. In general, for any programme there would be 2 - 4 PSOs. The assessment of these PSOs will be done along with the POs in all respects.

5.2 Evaluation of the Attainment of the Programme Outcomes

Different delivery methods are employed with individuals and groups. Some implementation techniques, however, are common to most programmes. They include Lectures / Presentation, Guest Lectures, Seminars, Workshops, Project Work, Road shows, Mentoring and Counselling, Industrial Tours, Certification Courses, Research projects, E-Resources, etc. Course assessment is done through internal and external exams and indirectly through student feedback and student end of year survey. Performance of the student in the examinations, seminars, projects etc indicates the level of attainment of knowledge and POs.

Undergraduate programme is for duration of four years. The courses are distributed taking care that some courses form prerequisite for the advanced courses and adequate exposure is given before activities like mini project and main project are attempted. Each semester has a planned assessment mechanism which includes continuous assessment and end semester examinations held. Mid examinations are conducted as part of summative assessments. Surveys are used as indirect methods periodically during the course and at the end of the course and beyond the course duration when the graduate becomes an alumnus and an employee or an entrepreneur.

- Indicators are assigned for each PO for the degree of attainment of PO depending on type of assessment method.
- Documentation is maintained at department or institution level depending on assessment method.
- The above data is evaluated by programme assessment committee to assess the degree of attainment of the POs and suggest suitable remedial measures if needed.
- The following assessment processes are used for achievement of the Programme Outcomes. Indirect assessment of attainment of POs is done through surveys. Opinions of the stake holders are collected through faculty, alumni, employers, parents, students and are collected at regular intervals. The questionnaire of the surveys are designed to address the attainment of POs. Student surveys are conducted at the end of each academic year. End of course survey is conducted with outgoing students at the end of their course.

6. Course Outcomes

Course outcomes for each course are drafted by the course coordinator or module coordinator. For each course there would be 5 – 7 outcomes. These COs are written as per Blooms taxonomy from knowledge levels 1 to 6, i.e. Remember (K1), Understand (K2), Apply (K3), Analyse (K4), Evaluate (K5) and Create (K6) by using the appropriate action verbs. Also, course outcomes should reflect from both higher order (K4 to K6) and lower order (K1 to K3). Question paper should also reflect the knowledge levels for the respective outcomes. For Example,

At the end of the course, the student will be able to			
Course code	**Course name**	**CO1**	Identify basic Engineering properties of …..(K2)
		CO2	Evaluate various experiments to …..(K5)
		CO3	Recognize and express……..(K2)
		CO4	Analyse the mechanism and ……. (K4)
		CO5	Distinguish field equipment used in …….(K4)
		CO6	Illustrate the importance of …….. (K3)
		CO7	Assess the mechanism of……..(K3)

7. CO-PO Mapping

Couse Code GR15A3010	**Program Outcomes**											
Course Outcomes	**a**	**B**	**c**	**d**	**E**	**f**	**g**	**H**	**I**	**j**	**K**	**L**
CO1	H	M	M							M		
CO2	M	H					M					M
CO3	M	H		H								
CO4		H	M				M					M
CO5		M	H				M					M
CO6	M			M		M					M	H
CO7			H	M		M	M			M		

Degree of relevance between CO and PO:

L: Slightly (Low) = 1; M: Moderately (Medium) = 2; H: Substantially (High) = 3

Mapping of CO-PO (Planning)

Couse Code GR15A3010	**Program Outcomes**											
Course Outcomes	**a**	**B**	**c**	**d**	**E**	**f**	**g**	**h**	**I**	**J**	**k**	**L**
CO1	**3**	**2**	**2**							**2**		
CO2	**2**	**3**					**2**					**2**
CO3	**2**	**3**		**3**								
CO4		**3**	**2**				**2**					**2**

CO5		**2**	**3**				**2**					**2**
CO6	**2**			**2**		**2**					**2**	**3**
CO7			**3**	**2**		**2**	**2**			**2**		
PO (expected)	**2.25**	**2.6**	**2.5**	**2.33**		**2**	**2**			**2**	**2**	**2.25**

8. Steps to Calculate CO-PO Attainment

Step I

1. Calculate CO attainment for internal examinations, assignments, tutorials, end semester examinations for theory and practical through Question and relevant CO mapping and marks for each question (here question means individual descriptive question, objective section as a whole, assignment or tutorial).
    a) Total number of students appeared for the examination (NST)
    b) Total number of students attempted the question (NSA)
    c) Total number of Students who got more than 60% marks (NSM)
    d) Threshold Attempt Percentage, TAP = 30%
    e) Threshold Marks Percentage, TMP = 60%
    f) CO attained is considered zero if the attempt % is less than TAP (30%) = (NSA/NST)
    g) Total number of students who got TMP = 60% or more marks for that question (NSM)
    h) Attainment value estimation 3,2 or 1 through relevance = (NSM/NST)
        i. If relevance % is 60% or more, score is 3
        ii. If relevance % is 50-59%, score is 2 **……(A)**
        iii. If relevance % is 30-49%, score is 1
        iv. If relevance % is less than 30%, score is 0
2. CO Weightage for internal and external marks (Direct) - CODn for the nth course

Mid Subjective (15 Marks) + Mid Objective (5 Marks) + Assignment (5 Marks) + Assessment (5 Marks) + External (70 Marks)

(This weightage may be varied as per the regulations)

3. CO calculation through Course End Survey (Indirect) – COIn for the nth course
    a) Total number of students who rate 3 or more on a scale of 1-5 in the survey for that question (NSM)
    b) Attainment value estimation 3, 2 or 1 through relevance = (NSM/NST)

        same as **(A)**
4. Final CO Weightage for Direct and Indirect - COFn for the nth course

90% of Direct + 10% of Indirect ----> **COFn = 0.9 x CODn + 0.1 x COIn**

5. CO calculation procedure is same for all the courses having course outcomes including theory, labs, mini projects, major projects, seminar, comprehensive viva, etc. However, appropriate rubrics are used to evaluate projects and seminars, for others direct questions are used.

NOTE: It is required to find the summary for each section of the course as well as for the entire cohort with all the sections for that course so that individual section performance can be used as a feedback for the concerned faculty and overall as the cohort performance as a whole for the course. But milking question wise marks for each section is cumbersome considering the secrecy of barcoding mapping with each roll number, therefore external exam direct evaluation for course attainment is done for the whole cohort and can be used for the CO final evaluation for the whole cohort. But as a feedback for the individual section faculty in charges, only sessionals (direct) and course end survey (indirect) are used to create additional section wise summary sheets. The same is done for all courses i.e. theory, labs, projects.

Step II

6. PO calculation (Direct) through CO-PO mapping with Final COs of all relevant courses
   a) Find the sum for all courses in such a way that for each course multiply Final CO attainment value with CO-PO mapping relevance value (3, 2 or 1) and divide with total number of relevant COs normalized on a scale of 3

   $\Sigma(\Sigma(\text{COF x Relevance})_7)_n$ / No of relevant COs /3

7. PO attainment through co-curricular (PO 1 to 5 & PSOs) and extra-curricular (PO 6 to 12) activities.
   a) Total number of students who rate 3 or more on a scale of 1-5 in the survey for that question (NSM)
   b) Attainment value estimation 3, 2 or 1 through relevance = (NSM/NST)

   same as **(A)**

8. PO calculation through Programme Exit Survey (Indirect)

   Procedure same as above for PO exit survey

9. **Total PO = 80% Direct PO + 20% (Co-curricular and Extra-curricular)**
10. **Final PO = 90% Total PO + 10% Exit survey**
11. PO attainment through various survey forms like Alumni, Industry, Parent, etc. Procedure same as above for PO exit survey

NOTE:

1. Knowledge levels (KL) for each course outcome
2. Question paper should reflect the KL as per CO
3. CO calculation for internal marks after MID I must be viewed before MID II
4. Threshold values and weightages can be restructured dynamically as and when required.

9. Flow Charts for Steps to calculate CO-PO Attainment

Steps indicated above in para 7, are represented in flowcharts for easier reference.

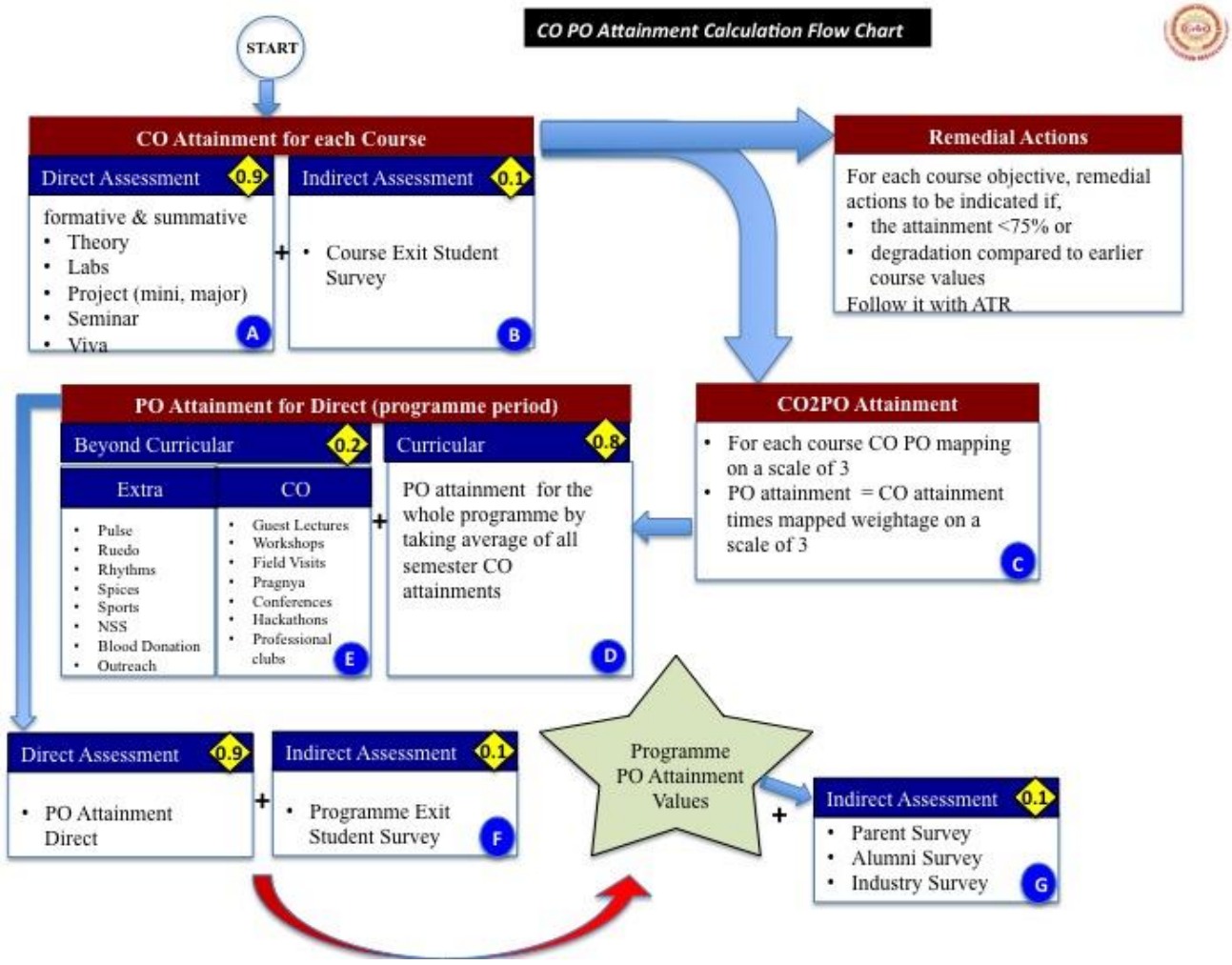

Figure 5: CO PO Attainment Calculation Flow Chart

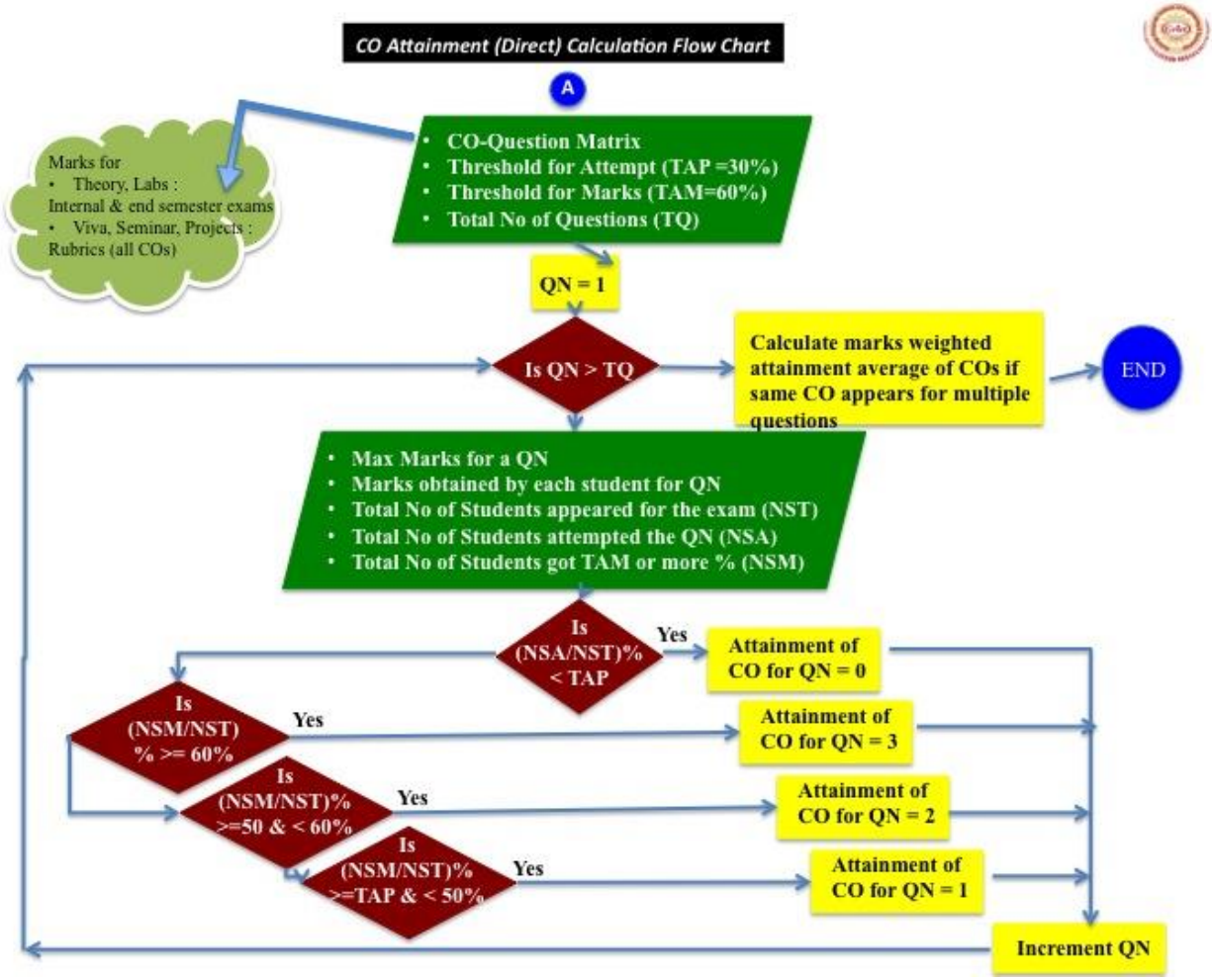

Figure 6: CO Attainment (Direct) Calculation Flow Chart

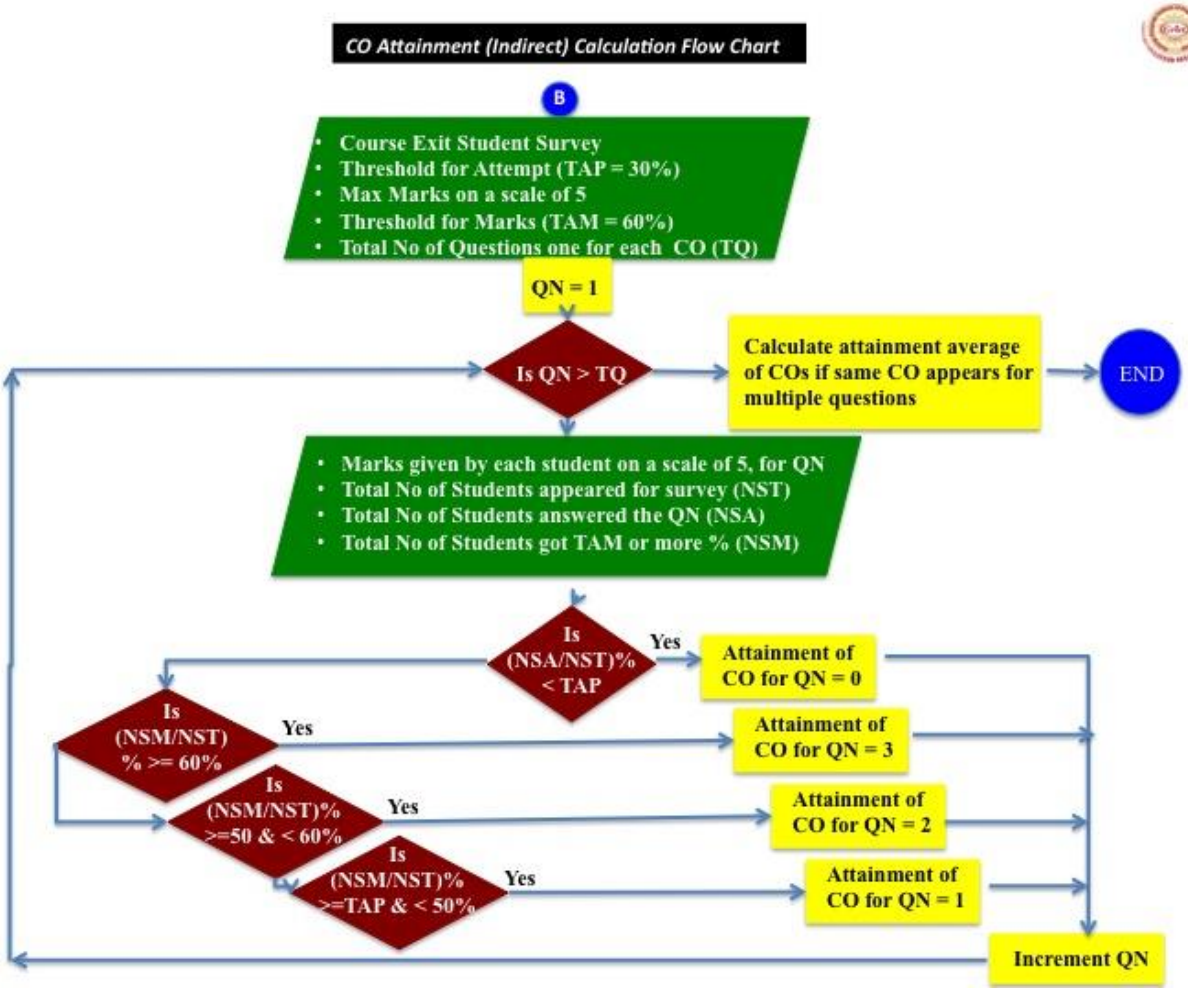

Figure 7: CO Attainment (Indirect) Calculation Flow Chart

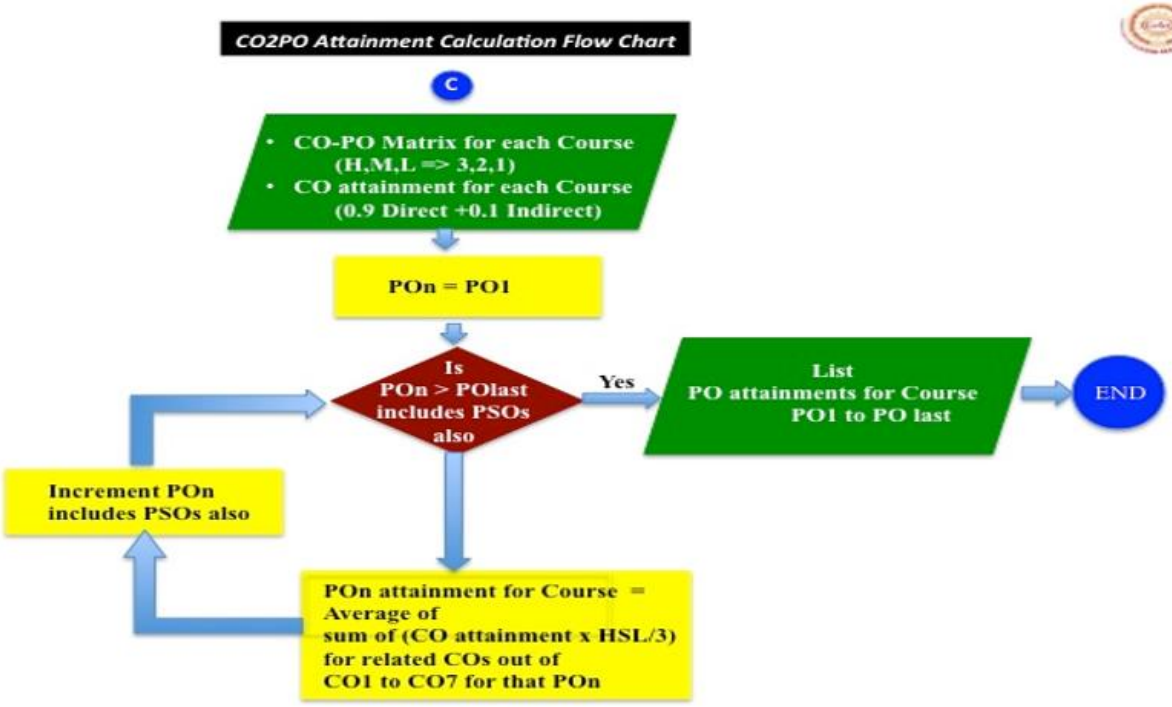

Figure 8: CO-PO Attainment Calculation Flow Chart

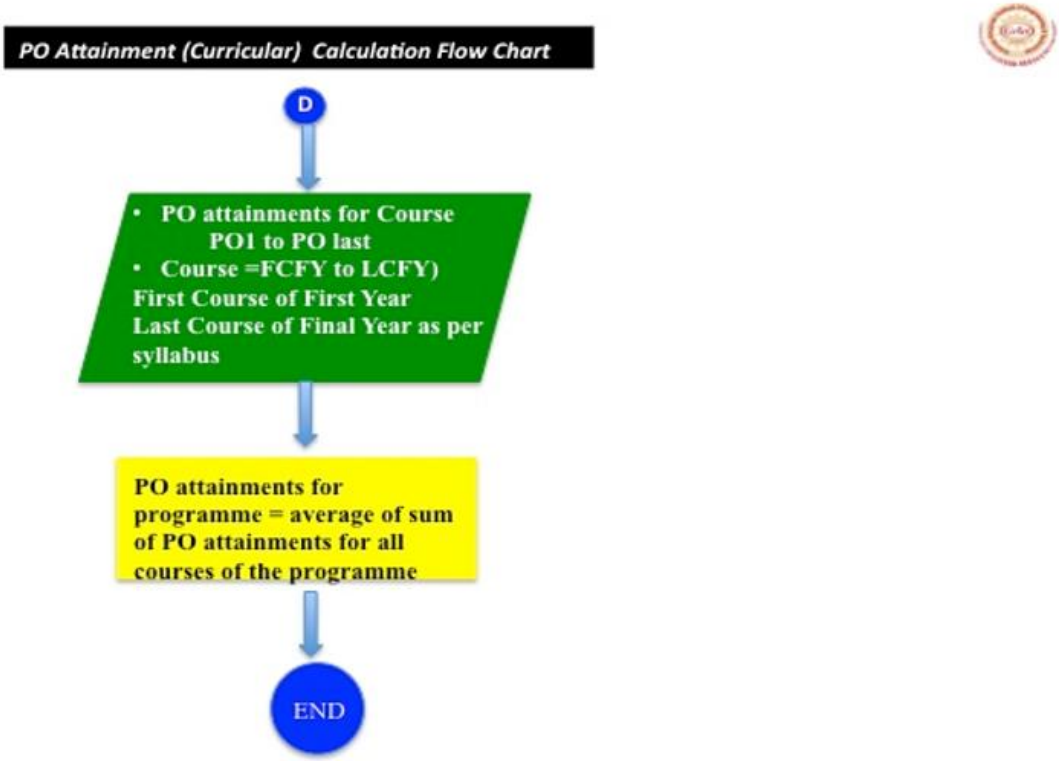

Figure 9: PO Attainment (Curricular) Calculation Flow Chart

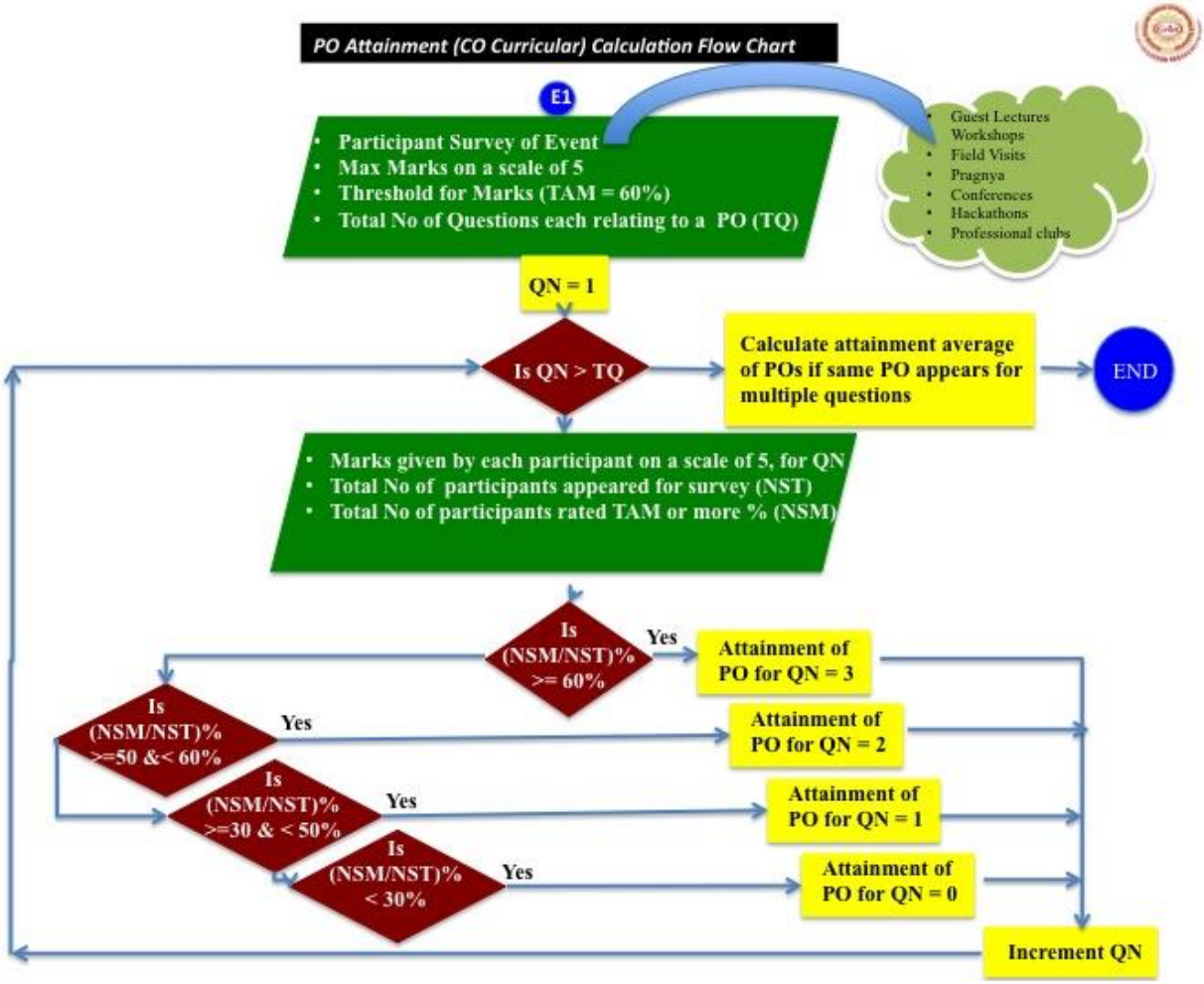

Figure 10: PO Attainment (Co-Curricular) Calculation Flow Chart

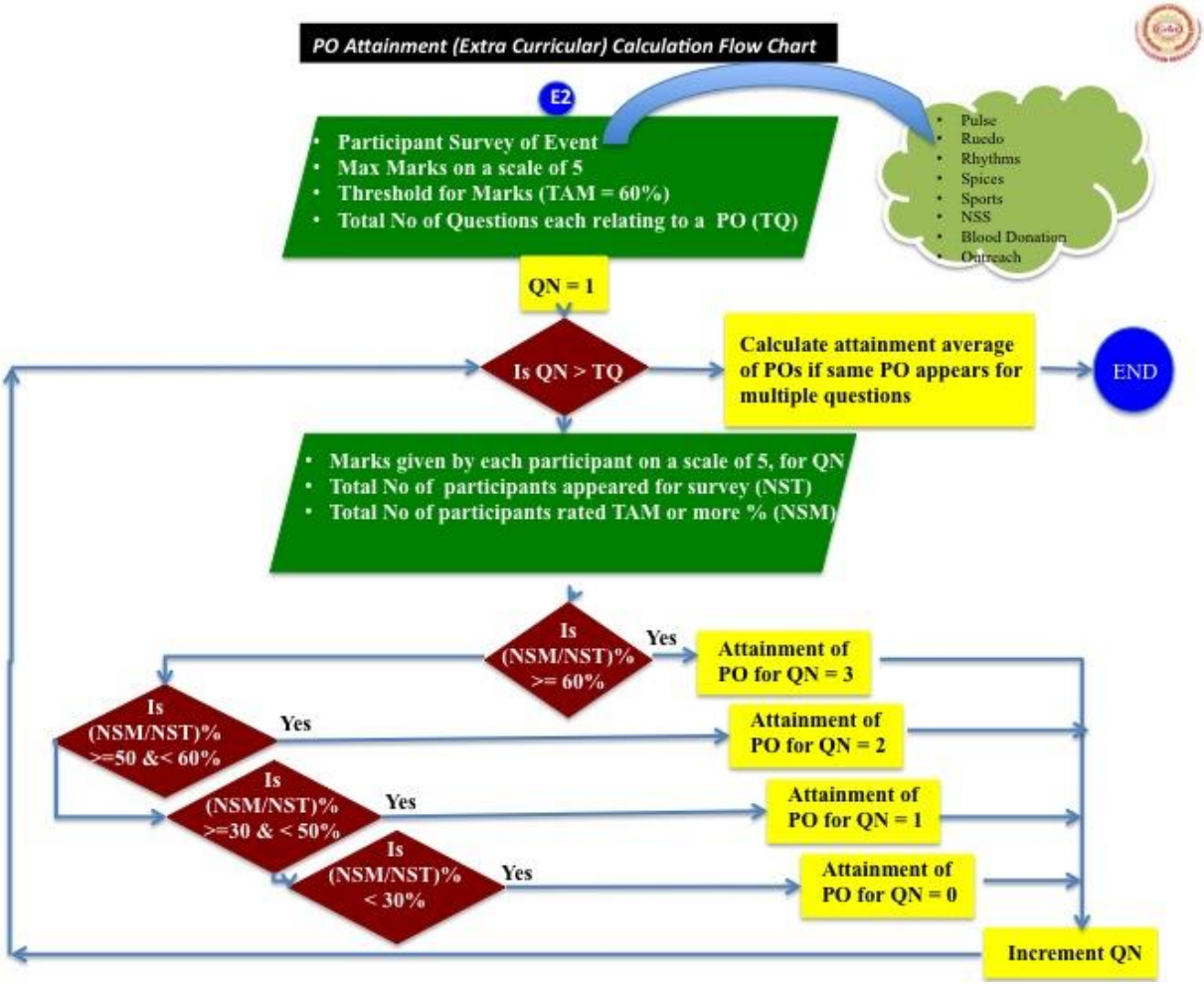

Figure 11: PO Attainment (Extra-Curricular) Calculation Flow Chart

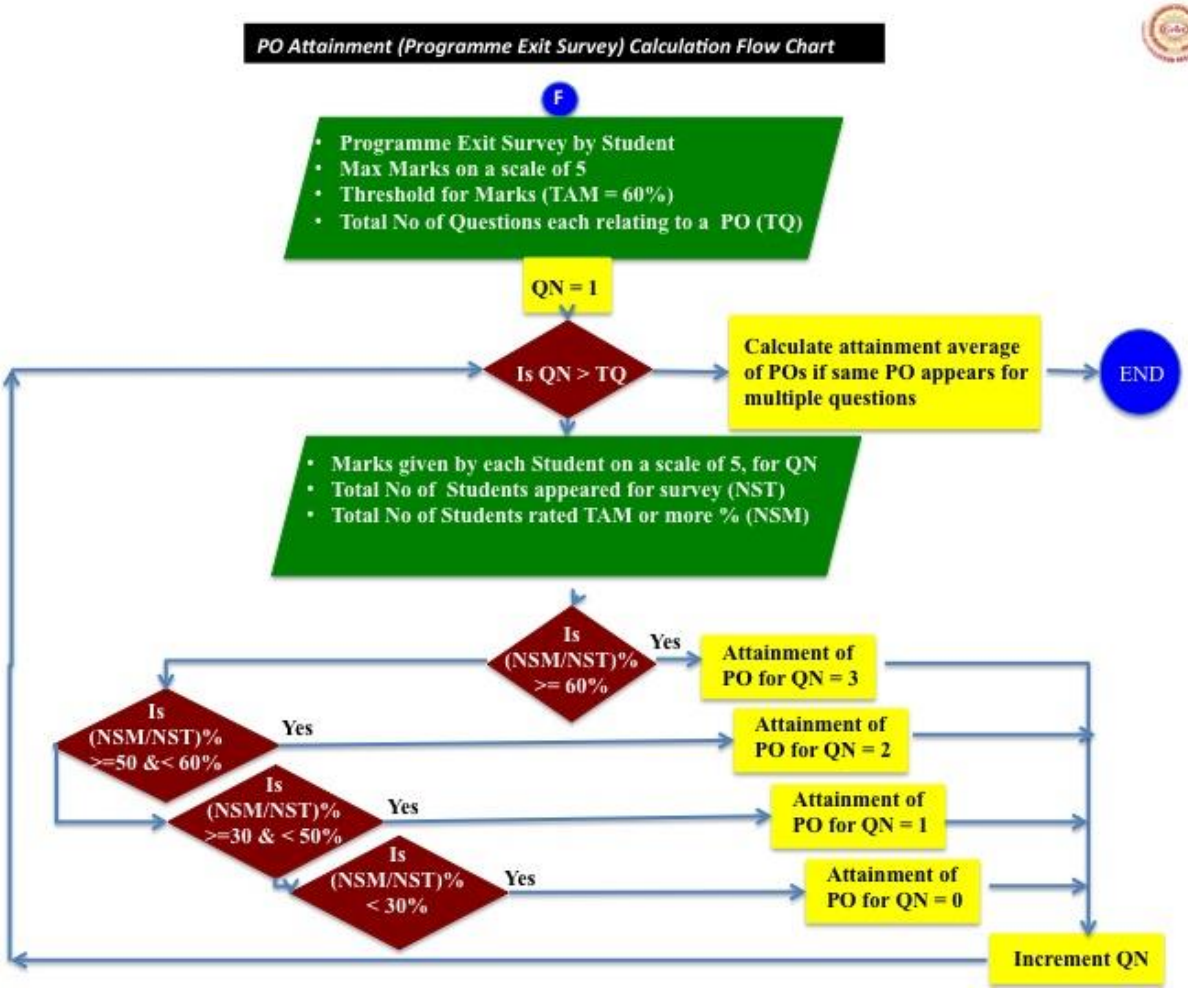

Figure 12: PO Attainment (Programme Exit Survey) Calculation Flow Chart

.

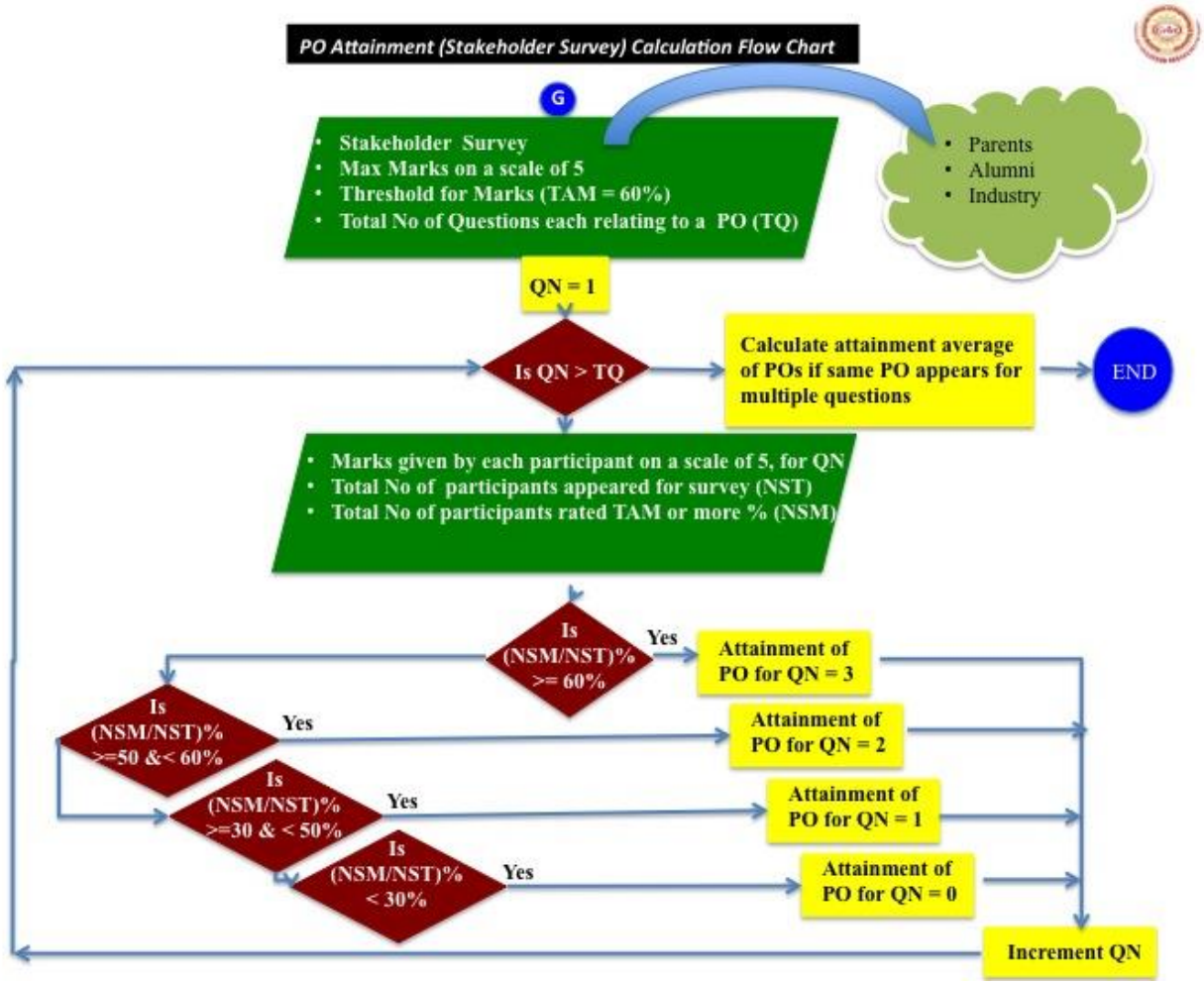

Figure 13: PO Attainment (Stakeholder Survey) Calculation Flow Chart

10. Sample CO Attainment for a Course

a) Internal – Mid I

	Mid -I								
	Q.No 1(a)	Q.No 1(b)	Q.No 2(a)	Q.No 2(b)	Q.No 3(a)	Q.No 3(b)	Q.No 4(a)	Q.No 4(b)	Objective Marks
Enter CO Number → 1,2,3,4,5,6,7	1	1	2	2,3	3	3	1	2	1,2,3
Marks →	3	2	2	3	2	3	2	3	5
1	3	2		1.5			0.5	3	4
2		1							4
125	2	2	1	3			1	2	4.5
126	A	A	A	A	A	A	A	A	A
127	1.5	1						0.5	2.5
Total number of students appeared for the examination (NST)	123	123	123	123	123	123	123	123	123
Total number of students attempted the question (NSA)	107	92	59	80	45	47	45	60	120
Attempt % (TAP) = (NSA/NST)*100	86.99	74.80	47.97	65.04	36.59	38.21	36.59	48.78	97.56
Total number of Students who got more than 60% marks (NSM)	66	62	28	51	13	10	13	38	90
Attainment % (TMP) = (NSM/NST)*100	53.66	50.41	22.76	41.46	10.57	8.13	10.57	30.89	73.17
Score(S)	2	2	0	1	0	0	0	1	3
CO Validation	1	1	2	2,3	3	3	1	2	1,2,3
Course Outcome	CO1	CO1	CO2	CO2,CO3	CO3	CO3	CO1	CO2	CO1,CO2, CO3
Marks (Y)	3	2	2	3	2	3	2	3	5
No. of COs Shared (Z)	1	1	1	2	1	1	1	1	3
Y/Z	3	2	2	1.5	2	3	2	3	1.66667
S*Y/Z	6	4	0	1.5	0	0	0	3	5
CO1	1	1	0	0	0	0	1	0	1
CO2	0	0	1	1	0	0	0	1	1
CO3	0	0	0	1	1	1	0	0	1
CO4	0	0	0	0	0	0	0	0	0
CO5	0	0	0	0	0	0	0	0	0
CO6	0	0	0	0	0	0	0	0	0
CO7	0	0	0	0	0	0	0	0	0

b) Internal – Mid II

	Mid -II								
	Q.No 1(a)	Q.No 1(b)	Q.No 2(a)	Q.No 2(b)	Q.No 3(a)	Q.No 3(b)	Q.No 4(a)	Q.No 4(b)	Objective Marks
Enter CO Number → 1,2,3,4,5,6,7	5		4	5	3	7	6		3,4,5,6,7
Marks →	5		2	3	3	2	5		5
1	3		1			1.5			2.5
2	5		1.5	2.5			4		3.5
125	3.5		2				1		3.5
126	3		1	1			1		2
127	A		A	A	A	A	A		A
Total number of students appeared for the examination (NST)	125		125	125	125	125	125		125
Total number of students attempted the question (NSA)	99		107	60	18	58	61		125
Attempt % (TAP) = (NSA/NST)*100	79.20		85.60	48.00	14.40	46.40	48.80		100.00
Total number of Students who got more than 60% marks (NSM)	70		63	16	8	41	22		72
Attainment % (TMP) = (NSM/NST)*100	56.00		50.40	12.80	6.40	32.80	17.60		57.60
Score(S)	2		2	0	0	1	0		2
CO Validation	5		4	5	3	7	6		3,4,5,6,7
Course Outcome	CO5		CO4	CO5	CO3	CO7	CO6		CO3,CO4, CO5,CO6,
Marks (Y)	5		2	3	3	2	5		5
No. of COs Shared (Z)	1		1	1	1	1	1		5
Y/Z	5		2	3	3	2	5		1
S*Y/Z	10		4	0	0	2	0		2
CO1	0		0	0	0	0	0		0
CO2	0		0	0	0	0	0		0
CO3	0		0	0	1	0	0		1
CO4	0		1	0	0	0	0		1
CO5	1		0	1	0	0	0		1
CO6	0		0	0	0	0	1		1
CO7	0		0	0	0	1	0		1

c) Internal – Assessment & Assignments

	Assignment Marks					Assessment
	I	II	III	IV	V	Marks
Enter CO Number → 1,2,3,4,5,6,7	1	2	3	4,5	6,7	1,2,3,4,5,6,7
Marks →	5	5	5	5	5	5
1	5	5	5	5	5	3
2	5	5	5	5	5	3
125						3
126						3
127						3
Total number of students appeared for the examination (NST)	127	127	127	127	127	127
Total number of students attempted the question (NSA)	67	67	67	67	67	127
Attempt % (TAP) = (NSA/NST)*100	52.76	52.76	52.76	52.76	52.76	100.00
Total number of Students who got more than 60% marks (NSM)	67	67	67	67	67	127
Attainment % (TMP) = (NSM/NST)*100	52.76	52.76	52.76	52.76	52.76	100.00
Score(S)	2	2	2	2	2	3
CO Validation	1	2	3	4,5	6,7	1,2,3,4,5,6,7
Course Outcome	CO1	CO2	CO3	CO4,CO5	CO6,CO7	CO1,CO2,CO3,CO4,CO5,CO6,CO7
Marks (Y)	5	5	5	5	5	5
No. of COs Shared (Z)	1	1	1	2	2	7
Y/Z	5	5	5	2.5	2.5	0.714285714
S*Y/Z	10	10	10	5	5	2.142857143
CO1	1	0	0	0	0	1
CO2	0	1	0	0	0	1
CO3	0	0	1	0	0	1
CO4	0	0	0	1	0	1
CO5	0	0	0	1	0	1
CO6	0	0	0	0	1	1
CO7	0	0	0	0	1	1

d) Internal Direct–CO (Mid1+ Mid II + Assignments +Assessment)

	CO1	CO2	CO3	CO4	CO5	CO6	CO7
Weighted Average for Attainment relevance (Internal CODn)	1.89	1.56	1.15	2.11	1.57	0.99	1.79

e) Indirect CO – Course Exit Student Survey

Enter Course Outcomes →	Identify the various soil exploration techniques and interpret the resulting soil profiles.	Assess the stability of slopes.	Compute earth pressures and stability of retaining walls.	Apply bearing capacity equations for shallow and deep foundations and to evaluate rate of settlement.	Identify and solve foundation related engineering problems.	Estimate pile and pile group capacity for soils.	Recognize the shapes and components of well foundations.
CO Number → 1,2,3,4,5,6,7	1	2	3	4	5	6	7
Marks →	5	5	5	5	5	5	5
1	5	5	5	5	5	5	5
2	5	4	4	4	4	4	2
124	5	5	5	5	2	5	4
125	2	5	5	5	2	5	4
126	5	5	3	5	1	5	4
Total number of students appeared for the examination (NST)	126	126	126	126	126	126	126
Total number of students attempted the question (NSA)	126	126	126	126	126	126	126
Attempt % (TAP) = (NSA/NST)*100	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total number of Students who got more than 60% marks (NSM)	102	122	124	108	76	98	80
Attainment % (TMP) = (NSM/NST)*100	80.95	96.83	98.41	85.71	60.32	77.78	63.49
Score(S)	3	3	3	3	3	3	3
Indirect CO (COIn)	CO1	CO2	CO3	CO4	CO5	CO6	CO7
	3	3	3	3	3	3	3

f) Direct External CO Attainment – End Semester Exam

	Part A										Part B										
	Q.No 1 (a)	Q.No 1 (b)	Q.No 1 ©	Q.No 1 (d)	Q.No 1 (e)	Q.No 1 (f)	Q.No 1 (g)	Q.No 1 (h)	Q.No 1 (i)	Q.No 1 (j)	Q.No 2	Q.No 3A	Q.No 3B	Q.No 4A	Q.No 4B	Q.No 5	Q.No 6A	Q.No 6B	Q.No 7A	Q.No 8A	Q.No 8B
Enter CO Number →	1	1	2	2	3	3	4	4	6	7	1	2	2	3	3	5	7	7	2	6	5
Marks →	2	2	2	2	2	2	2	2	2	2	10	5	5	5	5	10	5	5	10	5	5
1	1	2	0	1	2	0	1	2	2	1	5	3	5	3	3	5	4	3			
2	2	1	2	1	1	0	1	0	2	2	5			2	4	7	2	4	3		
129	2	2	1	1			2		2		8		4	0	2	0	3	2			
130	2		1	1	1	1	2	2	0		8			4	2	8					
Total number of students appeared	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
Total number of students	130	129	129	126	127	129	121	125	125	124	126	106	115	99	99	99	114	117	102	52	69
Attempt % (TAP) = (NSA/NST)*100	100.00	99.23	99.23	96.92	97.69	99.23	93.08	96.15	96.15	95.38	96.92	81.54	88.46	76.15	76.15	76.15	87.69	90.00	78.46	40.00	53.08
Total number of Students who got	97	105	90	71	82	43	69	63	81	57	102	68	93	61	75	60	101	85	52	7	39
Attainment % (TMP) =	74.62	80.77	69.23	54.62	63.08	33.08	53.08	48.46	62.31	43.85	78.46	52.31	71.54	46.92	57.69	46.15	77.69	65.38	40.00	5.38	30.00
Score(S)	3	3	3	2	3	1	2	1	3	1	3	2	3	1	2	1	3	3	1	0	1
CO Validation	1	1	2	2	3	3	4	4	6	7	1	2	2	3	3	5	7	7	2	6	5
Course Outcome	CO1	CO1	CO2	CO2	CO3	CO3	CO4	CO4	CO6	CO7	CO1	CO2	CO2	CO3	CO3	CO5	CO7	CO7	CO2	CO6	CO5
Marks (Y)	2	2	2	2	2	2	2	2	2	2	10	5	5	5	5	10	5	5	10	5	5
No. of COs Shared (Z)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Y/Z	2	2	2	2	2	2	2	2	2	2	10	5	5	5	5	10	5	5	10	5	5
S*Y/Z	6	6	6	4	6	2	4	2	6	2	30	10	15	5	10	10	15	15	10	0	5
CO1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
CO2	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0
CO3	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
CO4	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
CO5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
CO6	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
CO7	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0

Weighted Average for Attainment relevance (Internal CODn)	CO1	CO2	CO3	CO4	CO5	CO6	CO7
	3.00	1.88	1.64	1.50	1.00	0.86	2.67

g) Similar calculations are done for non-theory courses such as labs, seminars, viva, projects (refer appendix for detailed calculations along with rubrics and CO-question matrices).

11. Validation of CO Attainment

Based on the analysis done from the raw data obtained through various question paper patterns as per regulations, internal and external marks, knowledge levels, attainments, attempt percentage, etc., threshold value has been reviewed and revised.

- All the course outcomes must be assessed

- Threshold Attempt Percentage, TAP = 30%

  In view of choice of answering the questions and its reliability from difficult to easy questions, it has been decided to keep 30% as the minimum percentage for attempt for both internal and external examinations to suit all the regulations and different formats. When there is no choice, obviously, TAP becomes irrelevant. And accordingly, CO attainment is zero if the attempt percentage is less than 30.

- Threshold Marks Percentage, TMP = 60%

  Though wide range of engineering graduates are available with their diverse passing percentages of distinction, first class, second class, etc., most of the industries / employers looking for first class engineering graduates as their basic requirement. Observing this, threshold value has been revised to 60% for the percentage of marks obtained.

- **Score Band**

  Based on the number of students who got more than 60% of total marks for each question (NSM), again within this a band has been suggested. The range for this is selected in between 30% to 60% from the students of NSM. Attainment value with score of 3, 2, 1 or 0 for relevance >=60%, 50-59%, 30-49% or <30% respectively.

- **If CO attainment is chosen as 75% of max value of 3 for our institution for all the courses. Though a stiff target, keeps everybody on toes and motivates them to do better.**
- **CO Attainment Summary**

Attainment/CO	CO1	CO2	CO3	CO4	CO5	CO6	CO7
Attainment for Direct Internal CO (Mid I & II, Assignments, Tutorials, Assessments, etc.)	1.89	1.56	1.15	2.11	1.57	0.99	1.79
Attainment for Direct External CO (End Semester Exam)	3.00	1.88	1.64	1.50	1.00	0.86	2.67
Direct CO (0.3*Internal + 0.7*External)	2.67	1.78	1.50	1.68	1.17	0.90	2.40
Indirect CO	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Final CO (COFn) = (0.9 x Direct CO + 0.1 x Indirect CO)	**2.70**	**1.90**	**1.65**	**1.82**	**1.35**	**1.11**	**2.46**

CO	Course Outcome	Remedial Action for COs Less than 75% (2.25)
CO1	Identify the various soil exploration techniques and interpret the resulting	-
CO2	Assess the stability of slopes.	More number of numericals to be sovled for slope stability
CO3	Compute earth pressures and stability of retaining walls.	More classes for active and passive earth pressures
CO4	Apply bearing capacity equations for shallow and deep foundations and to evaluate rate of settlement.	More classes for shallow and deep foundations
CO5	Identify and solve foundation related engineering problems.	More number of numericals to be sovled
CO6	Estimate pile and pile group capacity for soils.	More number of numericals to be sovled for pile foundations
CO7	Recognize the shapes and components of well foundations.	-

ID No.	Name of the Faculty	Department	Signature

HOD **DAA**

Copy to: IQAC

12. Process of calculating PO Attainment

Mapping of CO-PO and PO Attainment Calculation through one Course

P-Outcomes / C-Outcomes	A	B	C	D	E	F	G	H	I	J	K	L
1	M	H		M					M			
2	M	H		M		M						
3	M	H		M		M				M		
4	H	M		M			M					
5	M	H		M		M						
6	H	M		M								M
7	M						M					M

Convert above mappings to scale 1-3

P-Outcomes / C-Outcomes	A	B	C	D	E	F	G	H	I	J	K	L
CO1	2	3		2					2			
CO2	2	3		2		2						
CO3	2	3		2		2				2		
CO4	3	2		2			2					
CO5	2	3		2		2						
CO6	3	2		2								2
CO7	2						2					2
Expected Attainment	2.29	2.67	0.00	2.00	0.00	2.00	2.00	0.00	2.00	2.00	0.00	2.00
				CO1	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**CO7**		
	Final Cos			2.70	1.90	1.65	1.82	1.35	1.11	2.46		

	Attained PO A	Attained PO B	Attained PO C	Attained PO D	Attained PO E	Attained PO F	Attained PO G	Attained PO H	Attained PO I	Attained PO J	Attained PO K	Attained PO L
CO1	1.80	2.70		1.80					1.80			
CO2	1.27	1.90		1.27		1.27						
CO3	1.10	1.65		1.10		1.10				1.10		
CO4	1.82	1.21		1.21			1.21					
CO5	0.90	1.35		0.90		0.90						
CO6	1.11	0.74		0.74								0.74
CO7	1.64						1.64					1.64
Attained	1.38	1.59	0.00	1.17	0.00	1.09	1.43	0.00	1.80	1.10	0.00	1.19
	A	B	C	D	E	F	G	H	I	J	K	L
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Expected	2.29	2.67		2.00		2.00	2.00		2.00	2.00		2.00
Attained	1.38	1.59		1.17		1.09	1.43		1.80	1.10		1.19
	U	U		U		U	U			U		U

13. Validation of PO Attainment

POs are the transformations or attributes expected at the end of the programme. These outcomes in the graduating students are the result of all the engagements undertaken through various curricular and beyond curricular activities provided by the institute through its academic and societal environments. These PO values are summated with those from beyond curricular activities undertaken by this cohort during their programme duration (four years for the UG and two years for the PG programs). As an example, one activity each for co-curricular and extra-curricular and the format to summarize for the whole programme duration are given for reference. These direct PO values are augmented with those from indirect surveys to arrive at Final POs.

a) PO Attainment for all the courses (Curricular)

		Attained POs											
Year-Semester (Academic Year)	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
I Yr - I Sem	LAVC	3.00	1.60		1.88	2.13		2.70	2.60	2.00		2.00	
	ACD	2.25	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	Eng	2.00	1.66	3.00	3.00	3.00	3.00	3.00	1.66	1.66	1.66	3.00	3.00
	EP	2.00	3.00	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	3.00
	CP	1.66	3.00	2.25	2.10	3.00		2.25	3.00	3.00	3.00	3.00	3.00
	FEE	1.66	3.00	2.25	2.10	1.66	3.00	2.25	3.00		3.00	3.00	3.00
	EW	1.66	3.00	2.50	2.00	1.66	3.00	2.25	3.00	3.00	3.00	3.00	3.00
	EP Lab	2.00	1.66	3.00	3.00	3.00	3.00	3.00	1.66	1.66	1.66	3.00	3.00
	CP Lab		3.00	2.50	3.00	1.66				2.50	3.00	3.00	
I Yr - II Sem	TCFS	2.00	3.00	2.50		1.66		3.00	3.00	2.50	3.00	3.00	3.00
	NM	2.00	3.00	2.50	3.00	1.66	2.25	3.00	2.25	2.50		2.50	3.00
	BEE	2.00	3.00	3.00	3.00	3.00			2.25	2.50	3.00	2.50	3.00
	EC	2.00	3.00	3.00	3.00	2.25	3.00	3.00	2.25	3.00	2.25	2.50	3.00
	EG	2.00	3.00	3.00	2.25	1.66	3.00		2.25	3.00	2.25	2.50	3.00
	DS	3.00	3.00	2.25	1.80	1.66	3.00		2.25		2.25	3.00	
	IT Workshop	2.00	2.25	3.00	1.80	1.66	3.00	3.00	2.25	3.00	2.25	3.00	3.00
	EC Lab	2.00	3.00	3.00	1.80	1.66	3.00		2.25	3.00	2.25	2.25	
	BCS	2.00	3.00	3.00	1.80	1.66	3.00		2.25	3.00	2.25	2.25	3.00
II Yr - I Sem	P & S	2.00	3.00	2.50		1.66		3.00	3.00	2.50	3.00	3.00	3.00
	MFCS	2.00	3.00	2.50	3.00	1.66	2.25	3.00	2.25	2.50		2.50	3.00
	DBMS	2.00	3.00	3.00	3.00	3.00			2.25	2.50	3.00	2.50	3.00
	ADS	2.00	3.00	3.00	3.00	2.25	3.00	3.00	2.25	3.00	2.25	2.50	3.00
	DLD	2.00	3.00	3.00	2.25	1.66	3.00		2.25	3.00	2.25	2.50	3.00
	DE Lab	3.00	3.00	2.25	1.80	1.66	3.00		2.25		2.25	3.00	
	ADS Lab	2.00	2.25	3.00	1.80	1.66	3.00	3.00	2.25	3.00	2.25	3.00	3.00
	DBMS Lab	2.00	3.00	3.00	1.80	1.66	3.00		2.25	3.00	2.25	2.25	3.00
II Yr - II Sem	MEFA	2.00	3.00	2.50		1.66		3.00	3.00	2.50	3.00	3.00	3.00
	CO	2.00	3.00	2.50	3.00	1.66	2.25	3.00	2.25	2.50		2.50	3.00
	OS	2.00	3.00	3.00	3.00	3.00			2.25	2.50	3.00	2.50	3.00
	OOPJ	2.00	3.00	3.00	3.00	2.25	3.00	3.00	2.25	3.00	2.25	2.50	3.00
	CN	2.00	3.00	3.00	2.25	1.66	3.00		2.25	3.00	2.25	2.50	3.00
	OOPJ Lab	3.00	3.00	2.25	1.80	1.66	3.00		2.25		2.25	3.00	
	OS CN Lab	2.00	2.25	3.00	1.80	1.66	3.00	3.00	2.25	3.00	2.25	3.00	3.00
	WD Lab	2.00	3.00	3.00	1.80	1.66	3.00		2.25	3.00	2.25	2.25	3.00
III Yr - I Sem	WT	3.00	3.00	3.00	1.80	1.66	3.00	3.00	3.00	3.00	3.00	3.00	3.00
	DAA	3.00	2.71	2.75	2.25	2.50		2.00	2.00	2.33	2.00	2.50	2.00
	SE	3.00	3.00	3.00	3.00	3.00	2.33	2.00	3.00		3.00	3.00	3.00
	MC	1.66	1.66	1.66	1.66	1.66	2.33	2.00	1.66	3.00	3.00	2.25	3.00
	DMA	1.66	1.66	1.66	1.66	1.66	2.33	2.00	1.66	3.00	3.00	2.25	2.71
	MC Lab	1.66	1.66	1.66	1.66	1.66	2.00	2.00	1.66			2.25	2.71
	WT Lab		2.33	2.75	3.00		2.00	2.00	1.66	3.00	3.00		3.00
III Yr - II Sem	ALP	3.00	2.33	1.80	3.00	3.00	2.00		3.00	3.00	3.00	2.25	
	OOAD	2.71	2.33	1.80		3.00	2.00	3.00			3.00	3.00	3.00
	DDS	2.71	3.00	2.75	3.00	3.00	2.00		3.00		2.25	2.00	
	IS	2.71	3.00	3.00		3.00	2.00			2.25	2.25	2.00	3.00
	ACD	2.71	3.00	2.33	3.00	2.75	2.00				3.00	2.00	3.00
	EBDA	2.71	2.00	2.33	3.00	3.00		2.25	2.25	2.25	3.00	2.00	2.00
	ALP Lab	3.00	3.00	2.33	3.00	3.00	3.00			2.25	3.00	2.00	2.00
	CD UML Lab	3.00	3.00			2.75			3.00	2.25	3.00	2.00	3.00
	IOMP	3.00	3.00	2.00	2.00	3.00	2.00	2.00	3.00	2.25	3.00	2.00	2.71
IV Yr - I Sem	SL		2.50	2.00	3.00	3.00	3.00	3.00				3.00	2.71
	ANN	1.75	2.50	3.00	3.00	2.75	1.66		3.00	3.00	3.00	1.66	2.71
	STM	2.00	3.00	2.71	3.00	3.00	3.00	3.00			3.00	1.66	2.71
	MWT	2.00	3.00	2.71				2.00	3.00	3.00		3.00	2.71
	BI	2.71	1.66	2.71		3.00		2.00	3.00	3.00		2.50	3.00
	MS	2.00	1.66	2.71	2.70	3.00	2.00	2.00		3.00	3.00	2.50	3.00
	SL Lab	1.80	1.66	3.00	2.60	3.00	2.00	2.00	3.00		3.00	2.50	1.30
	MWT Lab	1.80	1.66	1.20		3.00			2.00	2.75	3.00	2.50	1.50
	Animation Lab	2.00	1.66	1.30	2.30	3.00	3.00	2.00	3.00	3.00	3.00	2.50	1.60
IV Yr - II Sem	MAD	1.66	1.66	1.66	1.66	1.66	2.00	2.00	1.66			2.25	2.71
	DP		2.33	2.75	3.00		2.00	2.00	1.66	3.00	3.00		3.00
	E-COM	3.00	2.33		3.00	3.00	2.00		3.00		3.00	2.25	
	MAD Lab	2.71		1.80		3.00	2.00	3.00			3.00		3.00
	CVV	2.00	3.00	2.50				3.00	3.00	2.50	3.00	3.00	3.00
	Seminar		2.80		3.00	1.66	2.25		2.25	2.50		2.50	
	Major Project	2.00	3.00	3.00	3.00	3.00			2.25	2.50	3.00		3.00
Average PO Attainments		2.23	2.63	2.55	2.48	2.31	2.57	2.56	2.43	2.69	2.68	2.54	2.82
PO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

b) PO – Co-Curricular (Field Visit)

Enter Program Outcomes / Related Survey Question →	New exposure and experience and ability to implement in analysis and designing of civil engineering elements	Ability to do a case study and interpret the data related to problem solving in Civil Engineering	Ability to formulate and design any element of a structure within realistic constraints	Ability to recognize the gap between theory and practice and solve civil engineering problems	Ability of using effective learning tools
Program Outcome Number	1	2	3	4	5
Scale 1-5 indicating 1 - low and 5 - high	5	5	5	5	5
S.No/Roll No.	Enter Values in the Scale 1-5 indicating 1 - low and 5 - high				
17241A0106	2	2	2	2	2
17241A0136	5	4	4	3	5
19241D0106	4	4	4	4	4
Total number of students taken part in the Event (NST)	22	22	22	22	22
Total number of students attempted the Feedback Survey (NSA)	22	22	22	22	22
Attempt % (TAP) = (NSA/NST)*100	100	100	100	100	100
Total number of Students rated more than 60% (NSM)	15	19	21	13	10
Attainment % (TMP) = (NSM/NST)*100	68.18	86.36	95.45	59.09	45.45
Score(S)	3	3	3	2	1
Co-curricular Event PO Attainment	PO1	PO2	PO3	PO4	PO5
	3	3	3	2	1

c) PO – Extra-Curricular (Spices – a culinary competition)

Enter Program Outcomes / Related Survey Question →	Ability to develop and follow standard procedures and process	Ability to prepare standard solutions for suitable health and safety practices in kitchen.	Ability to recognize the importance of ethics	Ability to work effectively as an individual or in a team with interpersonal skills and authenticate professionalism	Ability to communicate effectively and practice during operational conditions	Ability to relate management responsibilities, leadership and customer service	Ability to recognize the need for cooking techniques and demonstrate skillfully
Program Outcome Number	6	7	8	9	10	11	12
Scale 1-5 indicating 1 - low and 5 - high	5	5	5	5	5	5	5
S.No/Roll No.	Enter Values in the Scale 1-5 indicating 1 - low and 5 - high						
First Record / 1	2	2	2	2	2	2	2
17241A0104	5	1	4	4	4	4	4
17241A0203	5	1	2	2	2	4	4
17241A1209	5	4	2	4	3	3	2
Total number of students taken part in the Event (NST)	26	26	26	26	26	26	26
Total number of students Attempted the Feedback Survey (NSA)	26	26	26	26	26	26	26
Attempt % (TAP) = (NSA/NST)*100	100	100	100	100	100	100	100
Total number of Students rated more than 60% (NSM)	18	12	11	17	16	21	21
Attainment % (TMP) = (NSM/NST)*100	69.23	46.15	42.31	65.38	61.54	80.77	80.77
Score(S)	3	1	1	3	3	3	3
Extra-curricular Event PO Attainment	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	3	1	1	3	3	3	3

d) Co & Extra Curricular Summary

S.No	Name of the Event	Date	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
2016-17														
1	Field Visit	20/12/2016	3	3	3	2	1							
2	Spices	22/01/2017						3	1	1	3	3	3	3
3	Quizicals	26/04/2017						3	3	2	3	2	3	3
2017-18														
1	Guest Lecture	20/09/2017	3	3	3	2	1							
2	Reudo	23/02/2018						3	1	1	3	3	3	3
3	Pragnya	22/04/2018						3	3	2	3	2	3	3
-														
2018-19														
1	Field Visit	21/07/2018	3	3	3	2	1							
2	Rhythms	22/03/2018						3	1	1	3	3	3	3
3	Pulse	26/04/2019						3	3	2	3	2	3	3
-														
-														
2019-20														
1	Field Visit	20/10/2019	3	3	3	2	1							
2	Green Campus	27/01/2020						3	1	1	3	3	3	3
3	NSS	15/02/2020						3	3	2	3	2	3	3
-														
-														
	Average Attainment		3	3	3	2	1	3	2	1.5	3	2.5	3	3

e) PO Exit Survey

Enter Program Outcomes / Related Survey Question →	Ability to implement Mathematics and Science in analysis and designing of Civil Engineering elements	Ability to do a case study related to problem solving in Civil Engineering	Ability to design any element of a structure	Ability to use the code book or hand books in solving complex problems	Ability of using GIS, STAAD or any other tools	Ability to do any assignment related to the impact of engineering solutions in a global, economic and societal context	Ability to do assignment on the effect of Civil Engineering solutions on environment and to demonstrate the need for sustainable development	Ability to recognize the importance of ethics in engineering	Ability to work effectively as an individual or in a team and to function on multi-disciplinary context	Ability to communicate effectively with engineering community and society	Ability to plan and execute a project	Ability to recognize the need for and to engage in life-long learning
Program Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Scale 1-5 indicating 1 - low and 5 - high	5	5	5	5	5	5	5	5	5	5	5	5
S.No. / Roll No.	Enter Values in the Scale 1-5 indicating 1 - low and 5 - high											
1	2	2	2	2	2	2	2	2	2	2	2	2
2	5	5	5	5	5	5	1	4	4	4	4	4
61	5	5	5	5	5	5	1	2	2	2	4	4
62	5	5	5	5	5	5	1	2	4	3	3	2
Total number of students in the Batch (IV Year) (NST)	62	62	62	62	62	62	62	62	62	62	62	62
Total number of students attempted the Exit Survey (NSA)	62	62	62	62	62	62	62	62	62	62	62	62
Attempt % (TAP) = (NSA/NST)*100	100	100	100	100	100	100	100	100	100	100	100	100
Total number of Students rated more than 60% (NSM)	44	57	58	35	37	37	27	44	52	39	42	37
Attainment % (TMP) = (NSM/NST)*100	70.97	91.94	93.55	56.45	59.68	59.68	43.55	70.97	83.87	62.90	67.74	59.68
Score(S)	3	3	3	2	2	2	1	3	3	3	3	2
PO Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	3	3	3	2	2	2	1	3	3	3	3	2

f) Final PO Attainment

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Direct PO	2.23	2.64	2.57	2.45	2.30	2.63	2.57	2.44	2.70	2.65	2.54	2.81
PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PO for co and extra curricular events during the program period	3	3	3	2	1	3	2	1.5	3	2.5	3	3
PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Total PO = 80% Direct PO + 20% (Co-curricular and Extra-curricular)	2.38	2.71	2.66	2.36	2.04	2.70	2.45	2.25	2.76	2.62	2.64	2.85
PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Indirect PO - Exit Survey	3	3	3	2	2	2	1	3	3	3	3	2
PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Final PO = 90% Total PO + 10% Exit Survey	2.45	2.74	2.69	2.33	2.04	2.63	2.31	2.33	2.78	2.66	2.67	2.76
PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Parent Survey	3	3	3	3	2	3	2	0	2	3	3	3
Alumni Survey	3	3	3	3	3	3	3	2	3	3	3	3
Industry Survey	3	3	3	3	3	3	1	2	3	3	3	1
Stakeholders PO	3.00	3.00	3.00	3.00	2.67	3.00	2.00	1.33	2.67	3.00	3.00	2.33

The final PO shall be available as the cohort exits from the institute. The stake holder survey, as and when available can be used to course correct the final PO in the same proportion of 90:10. Standards maintained or improved can be assessed comparing with the last cohort values. In an absolute scale the values can be compared with those from average value from CO-PO mapping. Accordingly, suitable remedial actions can be planned to augment the curricular or beyond curricular activities, strengthen pedagogy or in extreme cases suitably modify the outcome.

g) Cohort Final PO Summary

Cohort Final PO Summary

Name of the Program	B.Tech Civil Engineering			Batch	2016-20		Department	Civil Engineeirng				

Attainment/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PO (CO-PO matrix) (A)	2.68	2.76	2.87	2.67	2.89	2.67	2.89	2.88	2.79	2.67	2.78	2.91
Final PO - Attained (B)	2.57	2.63	2.55	1.94	2.09	1.89	2.56	2.43	1.99	1.86	2.54	2.82
U, if B < 0.75 of A				U	U	U			U	U		

PO	Program Outcome	Remedial Action
PO1	Ability to implement Mathematics and Science in analysis and designing of Civil Engineering elements	-
PO2	Ability to do a case study related to problem solving in Civil Engineering	-
PO3	Ability to design any element of a	-
PO4	Ability to use the code book or hand books in solving complex problems	More usage of ICT such as Flipped class rooms, Blended clas rooms, Moodle activities etc which helps students to communicate for continuous assessment.
PO5	Ability of using GIS, STAAD or any other tools	Students are encouraged to utilize open source software's in Civil Engineering practices.
PO6	Ability to do any assignment related to the impact of engineering solutions in a global, economic and societal context	Students are encouraged to participate in Hackethons, NSS activities, Conferences, Workshops, Seminars, etc at National and International level.
PO7	Ability to do assignment on the effect of Civil Engineering solutions on environment and to demonstrate the need for sustainable development	-
PO8	Ability to recognize the importance of ethics in engineering	-
PO9	Ability to work effectively as an individual or in a team and to function on multi-disciplinary context	Regular assessment through CRT classes, training programmes, etc which will enhance students ability to present themselves in interviews effectively.
PO10	Ability to communicate effectively with engineering community and society	Students are encouraged to do innovative projects, internships which will improve their technical knowledge and skills in turn benefits the society.
PO11	Ability to plan and execute a project	-
PO12	Ability to recognize the need for and to engage in life-long learning	-

HOD **PAC**

Copy to IQAC

14. Process of Redefining of POs

Based on the attainment of POs, PAC prepares the action plan to improve the courses of the programme thus influencing the attainment of Programme Outcomes. The improvement of PO attainment can be expected by bringing appropriate changes in course outcomes, curriculum, delivery methods, and assessment and evaluation methods. After receiving inputs from the internal committees Programme Assessment Committee (PAC), BOS and Academic Council will give the final approval for the necessary improvements. Once the action plan is defined, data for the performance indication is to be collected and analyzed and evaluated by the course coordinator to see the performance. This process continues till the performance improves to the target value. Based on the

requirement, redefining POs is considered though with the help of exit students survey, professional society survey, alumni survey, employer survey and feedback.

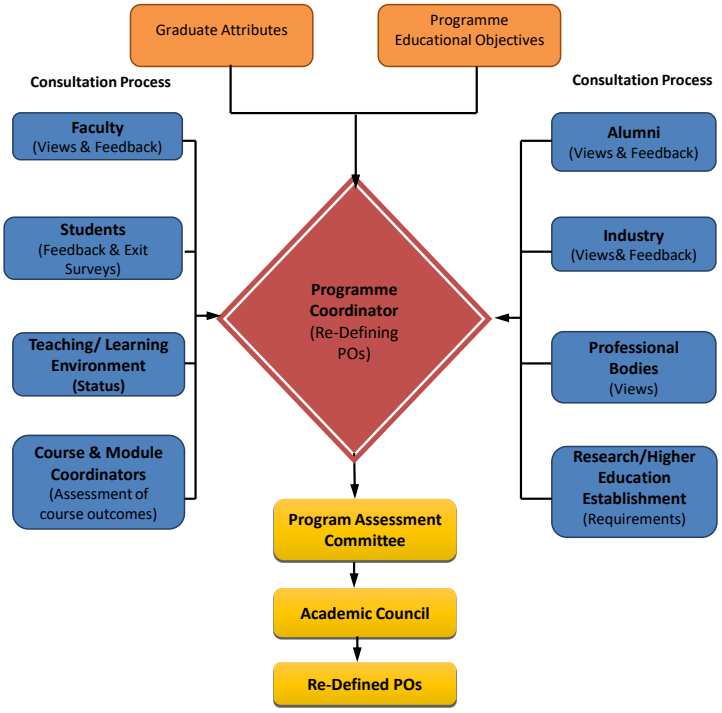

Figure 14: Process for Redefining POs

15. Process and validating PEO

Similar methodology can be adopted for PEO achievement estimation using PO-PEO mapping matrix. However, these require to be evaluated after a graduate leaves the institute and spends at least 3 to 5 years in the society. His growth, his contributions and society's impression on him truly represent the Programme Educational Objective and hence the achievement of the mission of the institute. After few batches, they may indicate the need to redefine the PEOs, as the society is dynamic in its nature and needs.

16. Process of Redefining of PEOs

For Redefining PEOs, exit students survey, professional bodies view, alumni survey, employer survey and feedback are collected by the Programme Coordinator. Based on the requirement, PEOs are reviewed and redefined and drafted by Programme Assessment Committee. The same is finalized by DAB (DDMC). Then the proposed PEOs are ratified by Academic Council.

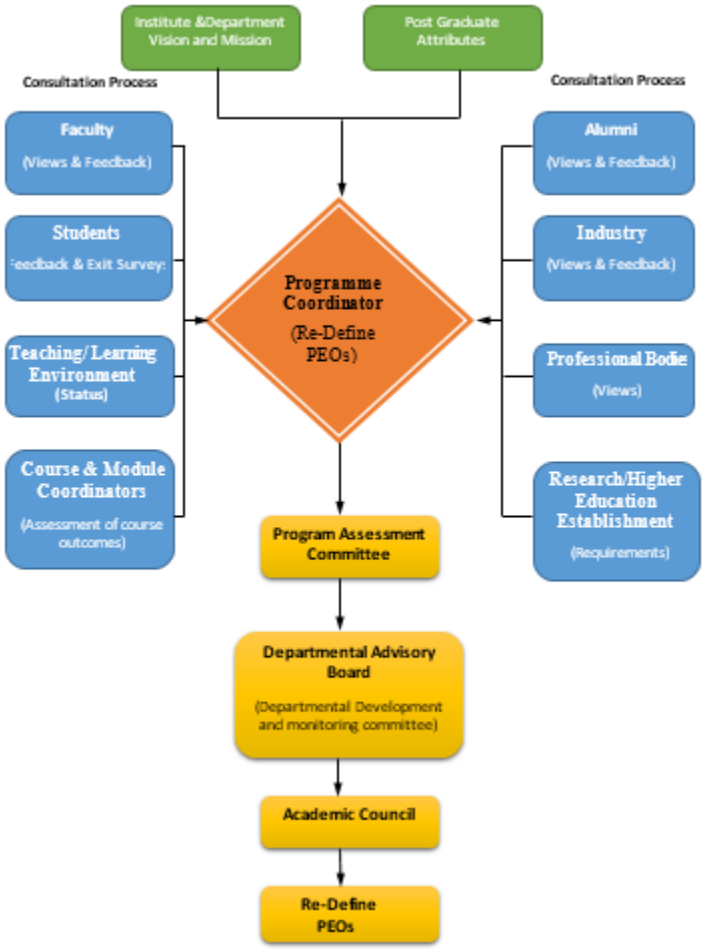

Figure 15: Redefining of Programme Educational Objectives

17. Conclusions

Outcome based education focuses on quality of achievement and student capability. It is student-centred. The measurement of outcome is done through appropriate assessments to identify the level of transformation. This transformation is evident in all the vital aspects of attitude, skills and knowledge. Rubrics, feedback, assessment, etc play an important role in OBE for continuous improvement through calculation of CO-PO attainments pointing to the extent of achievement of PEOs and mission of the institute. OBE, thus, is bringing in a paradigm shift in the fast-changing focus on teaching learning environment.

APPENDICES

1. Template for Internal CO for a Sample Theory Course
2. Template for Internal CO for a Sample Lab Course
3. Sample Question Paper with COs
4. Template for Rubrics
5. Template for External CO for a Sample Course (Theory)
6. Template for External CO for a Sample Course (Lab)
7. Template for Course Exit Survey
8. Template for Indirect CO for a Sample Course (Theory)
9. Template for Indirect CO for a Sample Course (Lab)
10. Template for CO Summary for a Course (Theory)
11. Template for CO Summary for a Course (Lab)
12. Template for Theory CO-PO Attainment
13. Template for Lab CO-PO Attainment
14. Template for PO Attainment Curricular
15. Template for Outcomes of Co-curricular Activity
16. Template PO Outcome of Co-curricular Activity
17. Template for Outcomes of Extra-curricular Activity
18. Template PO Outcome of Extra-curricular Activity
19. Template PO Attainment Beyond Curricular Activities for Programme
20. Template for Student Programme Exit Survey
21. Template PO Attainment Programme Exit Survey
22. Template for Cohort Final PO Attainment Summary
23. Template for Parent Survey
24. Template PO Attainment Parent Survey
25. Template for Alumni Survey
26. Template PO Alumni Survey
27. Template for Industry Survey
28. Template PO Attainment Industry Survey
29. Template Summary PO Attainment Stakeholders Survey
30. Template for Cohort Final PO Summary Report