



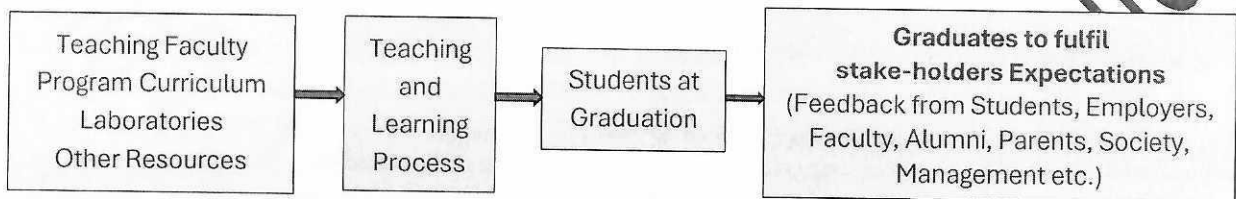
## OBE Manual

### ADOPTION / PROCEDURES OF OUTCOME BASED EDUCATION (OBE) IN THE AFFILIATED TECHNICAL INSTITUTION (GCET)

*Draft*

#### 1. OUTCOME BASED EDUCATION

Outcome Based Education (OBE) is an educational process which is directed / focussed at achieving certain specified outcomes in terms of individual student learning. Outcomes are the key things students should understand and be able to do or the competencies they should develop. Thus, OBE shift from measuring input and process to include measuring the output (ie outcomes).



- Assessment is mainly through Exams (Internal and External) and Assignments
- Assessment of faculty, staff, lecturer' material, assessment components, results, students' capabilities, continuous evaluation of students' performance, lab evaluation etc.
- More thinking type projects with rubric based analysis
- Feedback from Students, Faculty, Industry, Alumni, Parents and other stake-holders
- Continuous Improvement System with Gap Identification and Curriculum Planning

There is no single specified style of teaching or assessment in OBE. The role of the faculty adapts into instructor, trainer, facilitator, and/or mentor based on the outcomes targeted

#### 2. ACCREDITATIONS

Accreditation is a benchmarking process that review of the quality of higher education institutes / programs. Accreditation is a process of quality assurance and improvement, whereby a programme in an approved Institution is critically appraised to verify that the Institution or the programme continues to meet and/or exceed the Norms and Standards prescribed by regulator from time to time.

The National Board of Accreditation (NBA), a body for promoting international quality standards for technical education in India, has started accrediting only the programmes running with OBE from 2013. NBA mandates establishing a culture of outcomes-based education in institutions that offer Engineering, Pharmacy, Management programs.

#### 3. TYPE OF INSTITUTIONS

For the purpose of accreditation, there are two type of institutions :

- a. **Tier-I** : The institutions that have authority to design their curriculum and syllabus. For example, universities that can design own syllabus
- b. **Tier-II** : The institutions that don't have authority to design their curriculum and syllabus. Instead, they follow the prescribed curriculum and syllabus. For example, affiliating institutes, follow the syllabus of university, do not have freedom to design syllabus, like AKTU affiliated institutes.

*Draft*



## 4. WASHINGTON ACCORD

The Washington Accord (WA) Agreement - establishes equivalence of other countries' accredited professional engineering programs. With this, Accredited Engineering Graduates are recognized by other signatory countries - Possible employment as engineers in those countries without further examinations.

## 5. BLOOM'S TAXONOMY

Bloom's taxonomy is a set of three hierarchical models used to classify educational learning objectives into levels of complexity and specificity. Bloom's taxonomy is a classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding. The three domains of educational activities or learning include :

- Cognitive : Mental Skill (knowledge)
- Affective : Growth in feelings or emotional areas (attitude or self)
- Psychomotor : Manual or physical skill (skills)

CREATE	<b>Create something new using the information</b> Design, Assemble, Construct, Develop, Formulate, Author, Investigate
EVALUATE	<b>Decision Making after evaluating the information</b> Appraise, Argue, Defend, Judge, Select, Support
ANALYZE	<b>Draw connections among various ideas and concepts</b> Differentiate, Organize, Relate, Compare, Distinguish, Examine, Experiment, Test
APPLY	<b>Use information in New Situation</b> Execute, Implement, Solve, Use, Demonstrate, Interpret, Operate, Schedule, Sketch
UNDERSTAND	<b>Explain the meaning of instructional material</b> Describe, Explain, Classify, Discuss, Identify, Locate, Report, Select, Recognize
REMEMBER	<b>Recall facts and basic concepts</b> Define, duplicate, list, memorize, repeat, state

## 6. VISION AND MISSION

### VISION STATEMENT

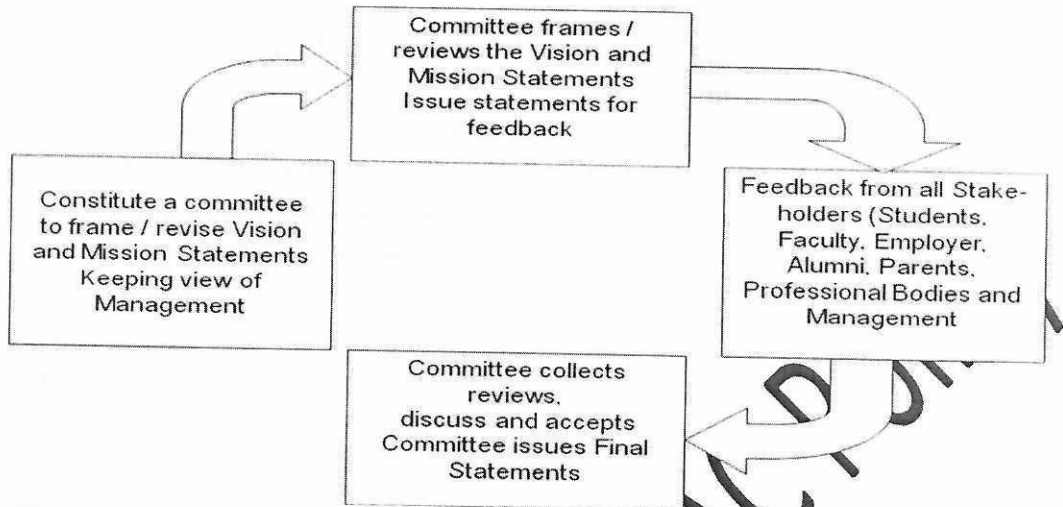
- ❖ Vision is a futuristic statement that the institution / department would like to achieve over a long period of time
- ❖ E.g. : To facilitate transformation of students into good human beings, responsible citizens and competent professionals, focusing on assimilation, generation and dissemination of knowledge

### MISSION STATEMENTS

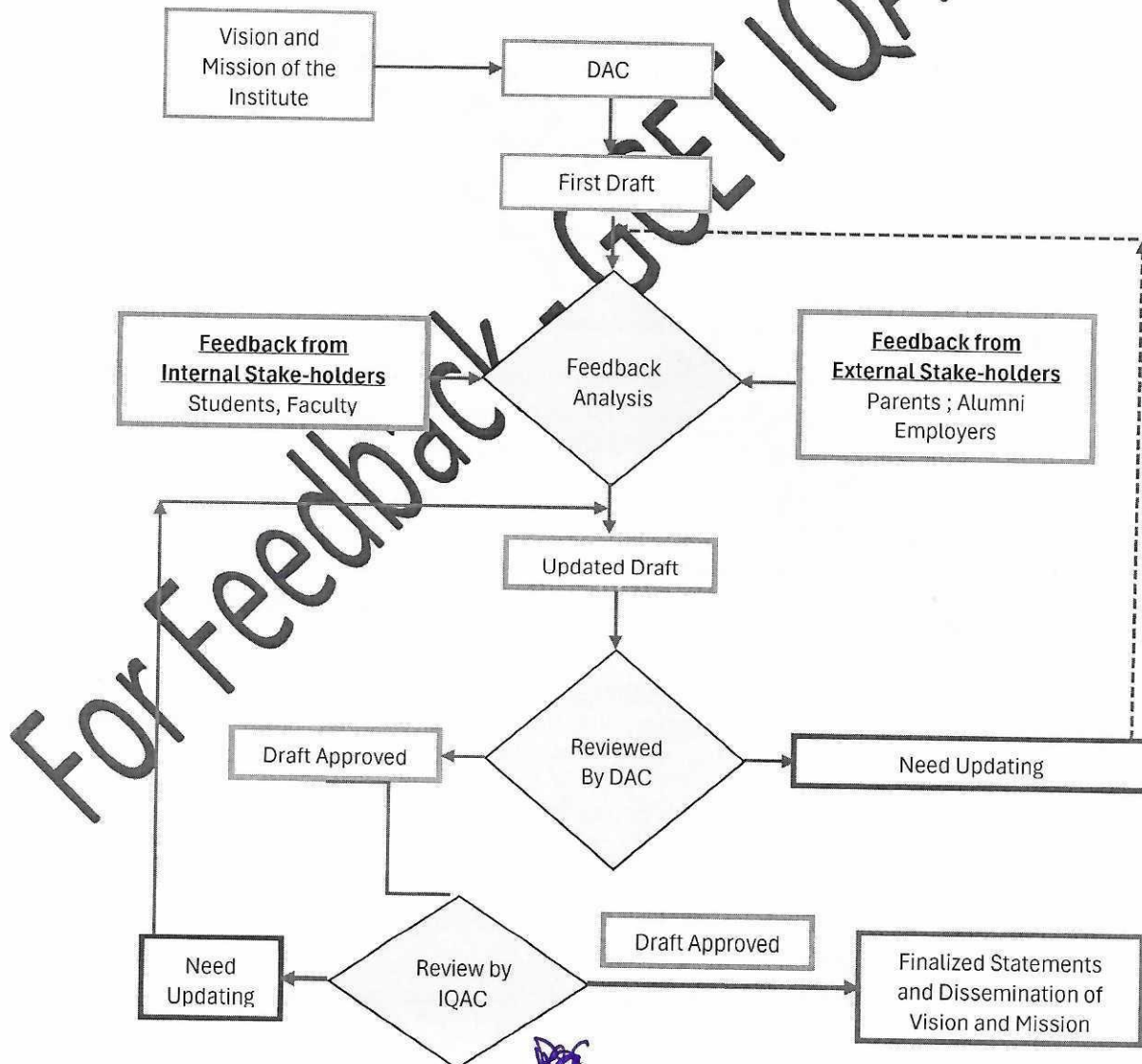
- ❖ Mission statements are essentially the means to achieve the vision
- ❖ E.g. : Impart quality education to meet the needs of profession and society, and achieve excellence in teaching-learning and research.
- ❖ E.g. : Attract and develop talented and committed human resource, and provide an environment conducive to innovation, creativity, team-spirit and entrepreneurial leadership.
- ❖ E.g. : Facilitate effective interactions among faculty and students, and foster networking with alumni, industries, institutions and other stake-holders.
- ❖ E.g. : Practice and promote high standards of professional ethics, transparency and accountability.



## 7. PROCESS OF DEFINING / REVIEWING VISION AND MISSION



### Defining Vision and Mission of Dept.





## 8. KNOWLEDGE AND ATTITUDE PROFILE (WK) AND PROGRAM OUTCOMES (POs)

### Knowledge and Attitude Profile (WK)

- WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
- WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
- WK3: A systematic, theory-based formulation of engineering fundamentals required in engineering discipline.
- WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
- WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
- WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
- WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.
- WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.
- WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

### Program Outcomes (POs)

- PO1: Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- PO2: Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
- PO3: Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
- PO4: Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
- PO5: Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
- PO6: The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
- PO7: Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
- PO8: Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.



**PO9: Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

**PO10: Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

**PO11: Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

## **9. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

PEOs are broad statements that describe the Career and Professional accomplishments that graduates are expected to attain within a few years after graduation and are based on the needs of the Program's constituencies. Guidelines for the PEOs are :

- PEOs should be consistent with the mission of the Institution; should be specific to the program and not too broad; and should be based on the needs of the stake holders.
- The number of PEOs should be manageable and should be achievable by the program

### **SAMPLE PEOs**

*The educational objectives of the ME undergraduate program are to:*

- *PEO1: Transform and develop students into competent professionals capable of solving technical and societal problems*
- *PEO2: Make the students fully aware of the way the mechanical engineering discipline is currently practised and to inculcate in them a thirst for further knowledge*
- *PEO3: Produce professionals with strong work ethics and high sensitivity to environment and sustainability issues*

## **10. PROGRAM SPECIFIC OUTCOMES (PSOs)**

Department has specifically defined few objectives or outcomes of the programme that deal with the requirements for engineering practice particular to the related sub-discipline and make students realize the fact that the knowledge and techniques learnt in this course has direct implication for the betterment of society and its sustainability. PSOs may be framed as per the faculty expertise / sponsored research / consultancy (key domain areas) that will indicate the strength of the program. PSOs are generally 2-4.

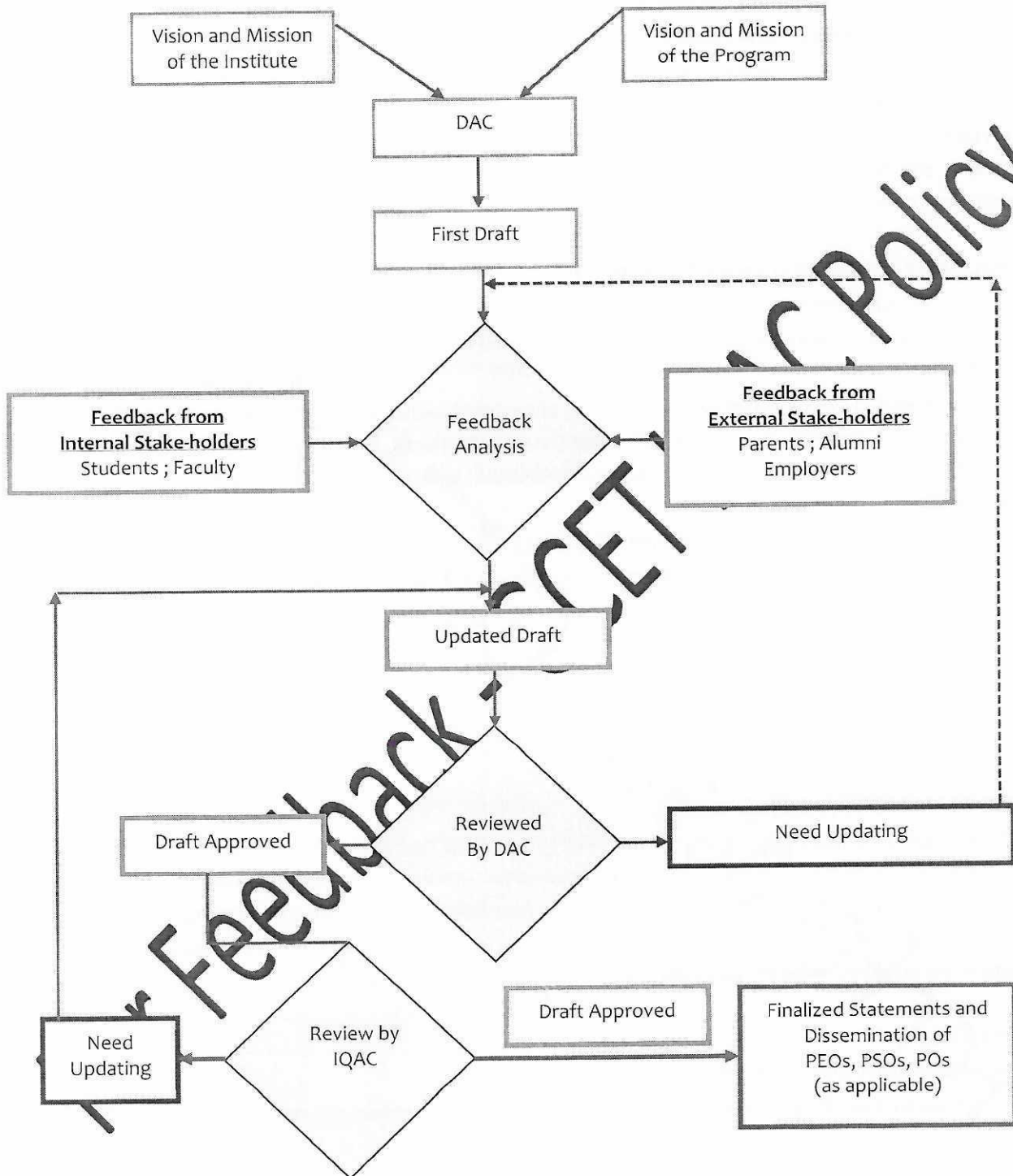
### **SAMPLE PSOs**

*The Mechanical engineering graduate will be able to:*

- *Conceptualize, design, make / improve physical products, processes and systems using principles of design, manufacturing and Industrial engineering.*
- *Design, develop and maintain various thermal engineering systems.*



## 11. PROCESS TO EVOLVE PEOs / PSOs

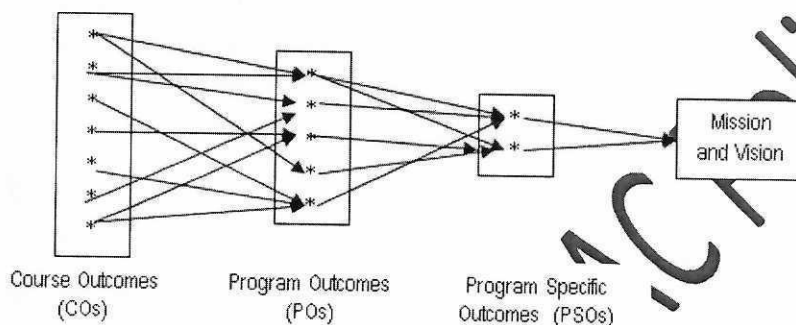




## 12. COURSE OUTCOMES (COs)

Course Outcomes are narrower statements that describe what students are expected to know, and are able to do at the end of each course. These relate to the skills, knowledge and behaviour that students acquire in their progress through the course

COs are statements that describe or list measurable and essential mastered content-knowledge—reflecting skills, competencies, and knowledge that students have achieved and can demonstrate upon successfully completing a course or subject.



### KEY POINTS

1. COs are the statements to be prepared using action verbs as per Bloom's Knowledge Level. The Bloom's Knowledge Level (BKL) should be linked with the CO.
2. COs should properly be mapped with relevant PO (one CO may be mapped with 3-5 POs)
3. These are to be measurable (quantitative manner) through Assessment Tools / components. Rubrics based evaluation is to be used to evaluate work progress of project / training / seminar.

### THE PRACTICE ADOPTED IN GCET IS :

- ❖ The institute (GCET) is an affiliated institute (Tier II, affiliated to Dr APJ Abdul Kalam Technical University (AKTU, formerly Uttar Pradesh Technical University), Lucknow.
- ❖ Syllabus with Teaching and Evaluation Scheme is prescribed by affiliating university i.e. AKTU.
- ❖ Prescribed Syllabus has content-wise COs for the subjects concerned (COs are not from entire syllabus of the subject - BKL-wise).
- ❖ IQAC is adopting AKTU's prescribed COs (COs prescribed by affiliating university) – which are similar content-wise (not from full syllabus; varies from 4-7). For simplification / monitoring point of view, the COs should be same in all the theory / lab courses, which will be 5 per course.
- ❖ DAC (in-consultation with subject teachers) reviews the prescribed COs and Syllabus. COs are updated / finalized with CO-wise Syllabus and CO-wise Questions Bank. Overlapping of syllabus / course content from one CO to another CO should be avoided. Further, CO-PO-PSO Mapping with Justification is also finalized by DAC.
- ❖ Entire course is being taught in sequence of similar contents and then dissimilar contents (or topic wise, as prescribed in syllabus). CO-wise Progress of Syllabus is reviewed on a regular basis and suitable actions are taken to ensure timely completion of syllabus concerned.
- ❖ For CO-attainment computations, it is desirable that conduct of exams should be CO-wise and evaluated marks data should be available CO-wise for each of the considered assessment tool / component. So, assessment components / methods are also reviewed by DAC (for conduct of additional assessment methods



other than centrally conducted Sessionals and PUTs) that should be aligned with COs so that students' performance can be measured CO-wise (in terms of marks obtained in each CO separately) for considered assessment components / methods.

- ❖ In its compliance, all the assessment components (Question Papers / Assignment / Quizzes etc.) are prepared CO-wise and CO-wise marks / assessment data is being captured for each of the assessment components.
- ❖ To ensure quality of assessment components, question papers are audited by DAC (as per prescribed Audit Form) and assignment / course-file contents etc. are also reviewed by DAC.
- ❖ To ensure data verification, all the evaluated answer sheets are stored for 2-years (as per college scrap policy). The marks / assessment data used for computation of attainment is same as depicted on evaluated answer-sheets (CO-wise). Entire computations of outcomes are being done on the basis of actual performance of students concerned (on the basis of actual marks obtained in any assessment component – wrt total number of the students concerned).

### 13. ASSESSMENT TOOL

#### ASSESSMENT TOOL : THEORY COURSE

Subject Type	Assessment components	Assessment Method	Assessment Tool	Frequency per Semester
Theory (all COs)	Direct Assessment (80% weightage)	Internal Assessment (30% ) weightage	CAE-I and II; PUTs Assignment / Quiz	One each One One for each CO
		External Assessment (70% weightage)	University Examination	Once
	Indirect Assessment (20% weightage)	-	Course Exit Survey	Once

#### ASSESSMENT TOOL : LAB COURSE

Subject Type	Assessment components	Assessment Method	Assessment Tool	Frequency per Semester
Lab (all COs)	Direct Assessment (80% weightage)	Internal Assessment (30% weightage)	Quiz / Viva and Continuous Evaluation	At the end of course / After every experiment
		External Assessment (70% weightage)	University Examination	Once
	Indirect Assessment (20% weightage)	-	Course Exit Survey	Once



## 14. ATTAINMENT LEVELS

### ATTAINMENT LEVELS : THEORY COURSE

Assessment Methods	Level	Range of Students in a class / branch with target marks
Direct Assessment (Internal Evaluation)	1	<50% student secure 60% marks
	2	>=50 <60% student secure 60% marks
	3	>=60% student secure 60% marks
Direct Assessment (External Evaluation)	1	<50% student secure 50% marks
	2	>=50 <60% student secure 50% marks
	3	>=60% student secure 50% marks
Indirect Assessment (Course Exit Survey)	To be conducted at 3-point scale and weighted methods is to be considered for Attainment Value of Indirect Assessment	

### ATTAINMENT LEVELS : LAB COURSE

Assessment Methods	Level	Range of Students in a class / branch with target marks
Direct Assessment (Internal Evaluation)	1	<50% student secure 70% marks
	2	>=50 <60% student secure 70% marks
	3	>=60% student secure 70% marks
Direct Assessment (External Evaluation)	1	<50% student secure 70% marks
	2	>=50 <60% student secure 70% marks
	3	>=60% student secure 70% marks
Indirect Assessment (Course Exit Survey)	To be conducted at 3 point scale and weighted method is to be considered for Attainment Value of Indirect Assessment	

## 15. ASSESSMENT TOOL / METHODS AND WEIGHTAGE

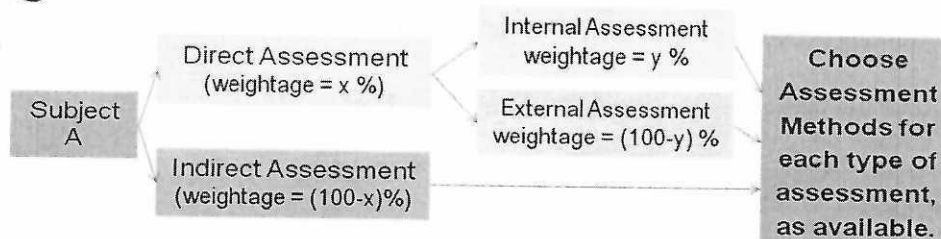
### ASSESSMENT TOOL / METHODS

Assessment Tools are the criteria / compilation of assessment methods (with relative weightage) to be considered to compute CO-attainment value. To compute attainment value of COs, there are two type of assessment methods :

- a. Direct Assessment
- b. Indirect Assessment

Further, Direct Assessment includes :

- a. Internal assessment (to be done at college level)
- b. External assessment (to be done at university level)





## Assessment Components for Direct Assessment (Internal)

- Written Tests (Sessional Tests / Class Tests), Pre University Tests
- Home-assignments, Quizzes
- Presentations, Viva, Models, Projects, Development of Teaching Aids
- Research Article Review, Case Study, Open Problem
- Continuous Assessment of Lab Work
- Group of any few can be defined / considered for CO-attainment (group of assessment methods may vary from one CO to another within the same course and similarly, for other courses)

## Assessment Component for Direct Assessment (External)

- End Semester Exams

## Assessment Component for Indirect Assessment

- Course Exit Survey / Teacher's Feedback about the course

## IN GENERAL, THE ADOPTED ASSESSMENT METHODS ARE :

### THEORY COURSE

- Direct (Internal) : CAE-I (from 2 COs), CAE-II (from other 2 COs), Pre-University Test (all 5 COs)  
: Home-assignment (one for each CO)  
: Quiz (optional, one for each CO) # To make equal marks for each CO, conduct QT for CO-5.
- Direct (External) : End Semester Marks (exams are to be conducted by AKTU)
- Indirect : Course Exit Survey – to be conducted on 3 point Likert Scale – at the end of classes

### LAB COURSE

- Direct (Internal) : Continuous Evaluation (Record, EIA, Viva)  
: Quiz (one for each CO)
- Direct (External) : End Semester Marks (exams are to be conducted by AKTU)
- Indirect : Course Exit Survey – to be conducted on 3 point Likert Scale – at the end of classes

## **16. WEIGHTAGE OF ASSESSMENT METHODS**

- The weightage of Direct and Indirect method is 80:20 percent.
- The weightage of Direct (Internal) and Direct (External) will be as per AKTU's Marks Scheme. The marks distribution of a subject as per AKTU's Teaching and Evaluation Scheme is as (any one) :

*Total Marks of Subject = 100 (Internal Marks = 30; External Marks = 70)*

Considering higher side of external assessment; the weightage of Direct (Internal) and Direct (External) will be 30% and 70% respective. The same will be adopted for Lab.



## 17. CONDUCT OF EXAMS AND CO-WISE MARKS DATA COLLECTION

### CONDUCT OF EXAMS FOR CO-WISE MARKS DATA COLLECTION (FOR THEORY COURSE)

The assessment components to collect the students' performance data (CO-wise) so as to compute CO-attainment are as follows :

CO	Skill / BKL	Assessment Component	Remarks
CO-1	Bloom's Knowledge Level – Upto K4	CAE-I, PUT, Assignment / Quiz	⇒ In Sessional's Question Papers, there will one section for each CO (having Internal Choice). With this, CO-wise students' performance can be measured. ⇒ Syllabus Progress / Coverage is about 40% (2 COs) for Sessional-I and next 40% (2 COs) for Sessional-II. PUTs are from full syllabus. ⇒ In PUT's Question Paper, COs are to be mentioned against each question and students performance is recorded CO-wise. ⇒ Assignment / Quiz is to be conducted CO-wise. ⇒ In each question paper (for each CO, to assess skill level), nearly 30% questions will be of K1-K2 Level, while remaining questions will be of K3-K4 level. One question of High Order Thinking Skill / Creativity may be given in each section (CO-wise), as a part of internal choice.
CO-2		CAE-I, PUT, Assignment / Quiz	
CO-3		CAE-II, PUT, Assignment / Quiz	
CO-4		CAE-II, PUT, Assignment / Quiz	
CO-5		Online Quiz, PUT, Assignment / Quiz	

### PATTERN OF QUESTION PAPERS (SESSIONALS AND PUTs)

Exam Name (Direct-Internal)	Comments
CAE – I (40 marks, 90 Min)	From 2 COs of the course, Two CO-wise Sections having internal (within the CO) choice, each CO or section is of 20 marks
CAE – II (40 marks, 90 Min)	From other 2 COs of the course, Two CO-wise Sections having internal (within the CO) choice, each CO or section is of 20 marks
Pre-University Test (PUT, 70 marks, 180 Min)	From ALL 5 COs of the course, FIVE CO-wise Sections having internal (within the CO) choice, each CO or section is of 14 marks

- ❖ With this, all COs (except 5<sup>th</sup> CO), are being evaluated at 20+14 = 34 Marks; while CO-5 is being evaluated at 0+14 = 14 marks. To make equal maximum marks for all COs, an ONLINE / OFFLINE Quiz of 20 marks (same contribution of CO in Sessionals) can be conducted prior to PUTs.

### CONDUCT OF EXAMS FOR CO-WISE MARKS DATA COLLECTION (FOR LAB COURSE)

For Lab Course, CO-Attainment of Direct (Internal) includes Continuous Evaluation (taking average value of all participating / mapped experiments) and Quiz / Viva (to be conducted CO-wise separately) for each CO. COs (3 to 5 in numbers) are being framed and mapped with few experiments – as concerned.



## 18. QUALITY OF QUESTION PAPERS / ASSIGNMENTS / QUIZZES

To check the standard / relevance of questions and overall quality of the Question Paper, the framed Question Paper is to be audited at dept level through DAC / Subject Heads / Module Coordinators (prior to submission to Exam Cell) or by a team of HODs (if Question Papers are generated through QBMS). Further, questions mentioned in questions bank and / or given in assignments / quizzes need to be reviewed at department level (through module coordinator / DAC) on random basis / sample basis.

## 19. COMPUTATION OF CO-ATTAINMENT (A SUGGESTED METHOD)

The method described hereunder is a suggestive method. There are many more / other methods for computation CO-attainment. The steps to compute attainment value of CO are as follows :

1. Finalize assessment methods and attainment level to compute CO-attainment.
  - a. Assessment Methods for Direct – Internal Assessment
  - b. Assessment Methods for Direct – External Assessment
  - c. Assessment Methods for Indirect Assessment
2. Collect the CO-wise marks data of all assessment methods for all the students of the subject / class. For example :
  - a. Percent of Marks Obtained in CO-1, CO-2, .. CO-n in Direct - Internal Assessment (including CO-wise all components of Direct – Internal Assessment like CAEs / PUTs / Assignment etc.)
  - b. Percent of Marks obtained in CO-1, CO-2, .. CO-n in Direct - External Assessment
  - c. Pay-off value in Indirect - Assessment
3. Find the number of students who secured marks same or more than target marks (as mentioned in attainment level), CO-wise. Compute percent of students (for the class or course concerned) securing target marks (same / more), CO-wise.
4. Based on this students percent, assign attainment level (1 or 2 or 3) – CO-wise, which is mentioned in attainment table, for all direct assessment modes.
5. Indirect Assessment will be done through conducted COURSE EXIT SURVEY (by the concerned course teacher at the end of the semester, for theory and lab courses - both), on a 3-point Likert Scale (Rubrics based : Agreed / Partially Agree / Disagree, for all COs). For example,
  - a. Say – for CO-1 : 80% of total students secured target marks (say 60% or more) in Direct-Internal assessment. So, assign attainment level as 3.
  - b. Say – 40% of total students secured target marks (say 50% or more) in Direct-External assessment. So, assign attainment level as 1. This will be same for all COs of the subject concerned as university (in end sem exams) did not provide CO-wise marks data.
  - c. The computation of Indirect attainment is as follows :

*Attainment Value of Each CO*

$$= [(3 \times \text{Students Count for Excellent}) + (2 \times \text{Students Count for Good}) + (1 \times \text{Students Count for Poor})] / \text{Total No. of Students}$$

*Attainment Value of Indirect Assessment (on a scale of 3) = Average of Attainment value of all COs*

6. For a subject, take average of all COs for various assessment methods (as applicable).  
For example : Say - there are 5 COs in a subject. The CO-wise attainment level for various assessment methods is as follows :



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CO No.	1	2	3	4	5	Average
Direct – Internal	3	2	2	2	3	12/5=2.4
Direct – External (same for all COs)	1					1.0
Indirect	3	3	3	3	3	15/5=3.0

7. Based on relative weightage of different assessment methods, compute final CO-attainment value of subject.  
Weightage are → Direct (80%), and Indirect (20%)

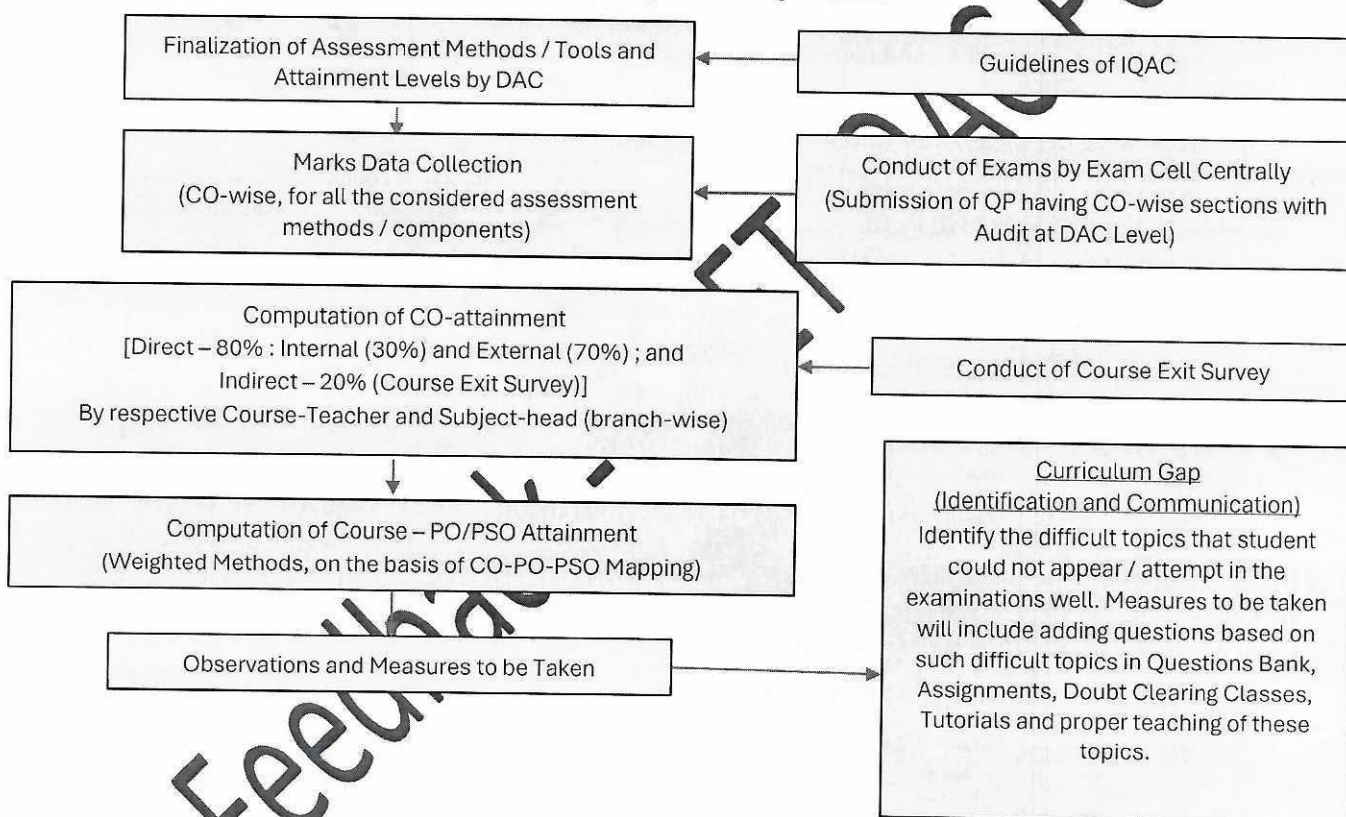
Direct has internal = 30% and external = 70%.

So, CO-attainment will be

$$\rightarrow [0.80 \times \{\text{Direct}\}] + [0.20 \times \text{Indirect}]$$

$$\rightarrow [0.80 \times \{(0.30 \times \text{Direct-Internal}) + (0.70 \times \text{Direct-External})\}] + [0.20 \times \text{Indirect}]$$

$$\rightarrow [0.80 \times \{(0.30 \times 2.4) + (0.70 \times 1.0)\}] + [0.20 \times 3.0] \rightarrow 1.74$$



## 20. COMPUTATION OF COURSE-PO/PSO ATTAINMENT (A SUGGESTED METHOD)

The obtained CO-attainment value is put in below mentioned table (in all Course-PO-PSO mapped cells and weighted PO-PSO attainment is computed for the course (which is to be mentioned in PO-PSO Attainment Table for the concerned course).

S. No.	Description	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
1	CO-PO Mapping Value (3)														
2	CO-Attainment Value (3)														
3	Weighted CO-PO Attainment Value (3)														

Weighted CO-PO-Attainment Value is the multiplication of CO-PO Mapping Value (as per S. No. 1) and CO-Attainment Value (As per S No. 2) with respect to Level (i.e. 3)  
i.e. PO-Attainment Value (S. No. 3) = [ (Mapping Value as per S. No. 1) x (CO-Attainment Value as per S No 2) ] / 3



## 21. TARGET LEVEL OF POs (A SUGGESTED METHOD)

- a. Prepare Course CO (course-wise - average of all COs) – PO Mapping Table for all the courses concerned (of entire curriculum) and take average of all participating cell of CO (PO-wise). E.g. :

S. No.	Course No	Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
1	C-101		2.67		2.0			1.67					
21	C-201			2.0									
32	C-301		2.0										
56	C-409		3.0		3.0								
PO-Target Level (3)			<b>2.34</b>	2.0	1.50			1.67					

Calculation : Target Level for PO-1 (on a scale of 3)

$$= \text{Average of participating cell of Course's CO-PO Mapping Table} = (2.67 + 2.0 + 3.0) / 3$$

$$= 2.34$$

- b. Year-wise, PO-target level may be increased by 5% to 10%.

## 22. ATTAINMENT OF POs AND PSOs

Attainment of Program Outcomes (PO) consists of two components :

- PO-Attainment (Direct)
- PO-Attainment (Indirect)

The various component of Direct / Indirect methods includes

Direct : Average of Course-wise PO-PSO Attainment Value  
(weighted, obtained through CO-attainment)

Indirect : Average (weighted) of Feedbacks  
(Graduate Exit Survey / Parents Feedback / Alumni Feedback and Employer Feedback)

### COMPUTATION OF PO-ATTAINMENT (DIRECT)

- PO-Attainment (Direct) is being computed on the basis of CO-PO Mapping. A table comprising of all the courses of the curriculum (which are studied by the student during his / her entire curriculum of 4 years), row-wise and its mapping with all POs / PSOs.
- Course - PO / PSO attainment value (Weighted CO-Attainment Value) is being put in all the respective CO-PO-PSO mapped cells (for each courses)
- Compute weighted value of CO-PO Attainment (for each mapped Course-PO Cell).
- Put this value in Course-PO Table and take average (PO / Column-wise). This will be the value of PO-Attainment (Direct).



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## Example

These Course – PO / PSO attainment (weighted CO-attainment) values (for a course) are to be put in Course-wise CO-PO / PSO Table (replacing CO-PO mapping values by PO-wise obtained attainment values). Refer following :

S. No.	Course No	CO-attainment Value (3)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
1	C-101		2.14		1.60			1.34							
27	C-209		2.17		2.2			1.22							
36	C-306														
56	C-409		2.41		2.21										
<b>PO / PSO Attainment</b>			<b>2.24</b>												

Calculation for PO-PSO Attainment (Direct) = Column-wise Average of all participating cells (PO-wise)

Calculation for PO-PSO Attainment (Direct) # PO-1 =>  $(2.14 + 2.17 + 2.41) = 2.24$

## COMPUTATION OF PO-ATTAINMENT (INDIRECT)

- For PO-PSO attainment (Indirect) assessment, conduct Graduate Exit Survey (Program Exit Survey), Employers Feedback, Alumni Feedback and Parents Feedbacks during / at the end of the program (final year passing-out students) on a 3-point Likert Scale (Rubrics : Agree / Partially agree / Disagree).
- For each of the feedback, compute attainment value separately as per following:

PO-PSO Attainment (Indirect, of particular feedback type) value (on a scale of 3) for any PO or PSO is :

=  $[(3 \times \text{Students Count for Excellent}) + (2 \times \text{Students Count for Good}) + (1 \times \text{Students Count for Poor})] / \text{Total No. of Students}$

- Put all these Feedbacks in below mentioned table.

S. No.	Subject Name	Value of PO-Attainment - Indirect (Delete all ZERO values)											Value of PSO-attainment					
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
1	Graduate Exit Survey																	
2	Parents Feedback																	
3	Alumni Feedback																	
4	Employer Feedback																	
Value of PO-Attainment (Indirect)																		

This will give the value of PO-PSO Indirect attainment.

## COMPUTATION OF PO-ATTAINMENT (OVERALL)

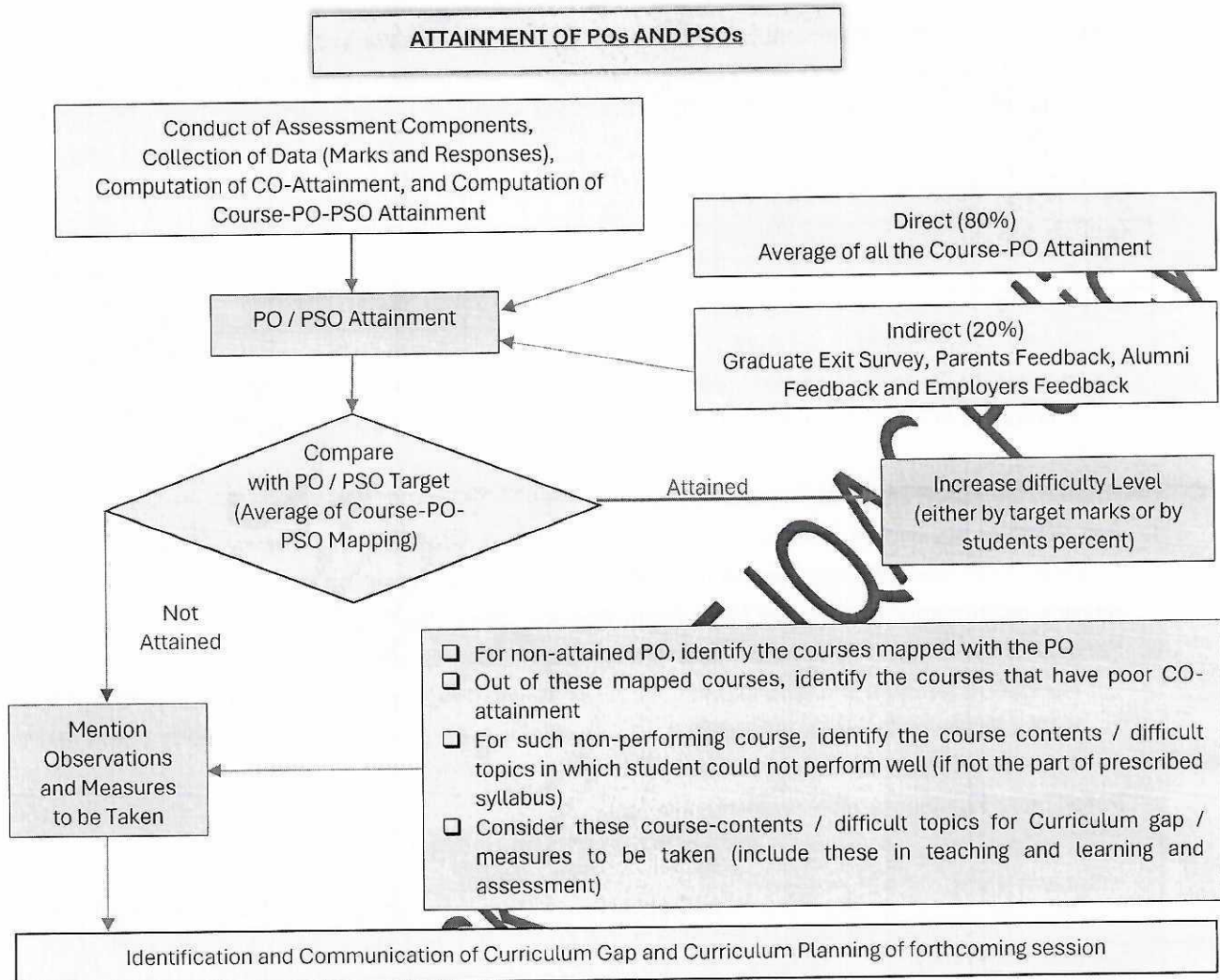
Final PO / PSO attainment (on a scale of 3) will be computed having 80% weightage to PO-Attainment (Direct) and 20% weightage to PO / PSO Attainment (Indirect). This is as follows :

S. No.	PO / PSO Attainment	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
1	Direct (80%)	2.24		1.60			1.34							
2	Indirect (20%)	2.55		2.2			1.22							
<b>PO-Attainment</b>		<b>2.30</b>		1.72			1.32							

Calculation for PO / PSO – Attainment (Overall, On a scale of 3)

=  $(0.8 \times \text{'PO / PSO – Direct Attainment'}) + (0.2 \times \text{'PO / PSO – Indirect Attainment'})$

Calculation for PO-Attainment # PO-1 =>  $(0.8 \times 2.24) + (0.2 \times 2.55) = 2.30$



### 23. OBSERVATIONS AND MEASURES TO BE TAKEN

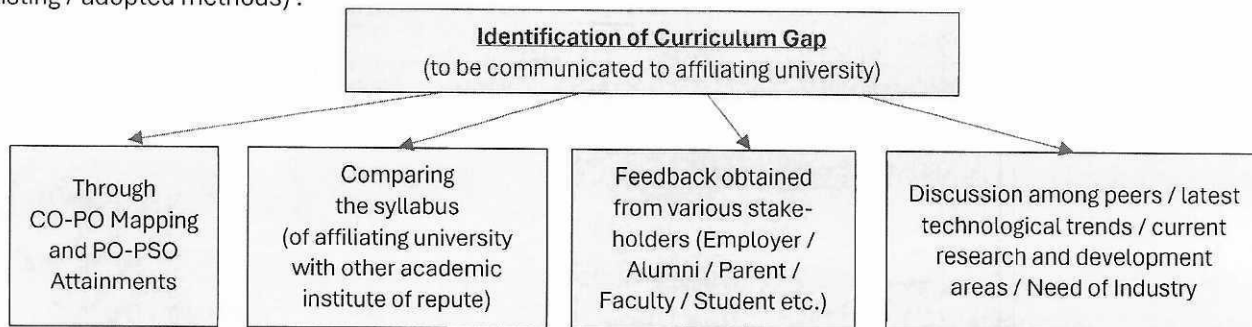
On the basis of PO-PSO attainment, observations and measures to be taken are to be documented. The gaps (through PO-attainment computations) measures to be taken may be identified by considering the following (in addition to existing / adopted methods):

- ❖ For non-attained PO, identify the courses mapped with the PO
- ❖ Out of these mapped courses, identify the courses that have poor CO-attainment
- ❖ For such non-performing course, identify the course contents / difficult topics in which student could not perform well (if not the part of prescribed syllabus)
- ❖ Consider these course-contents / difficult topics for Curriculum gap / measures to be taken (include these in teaching and learning and assessment)



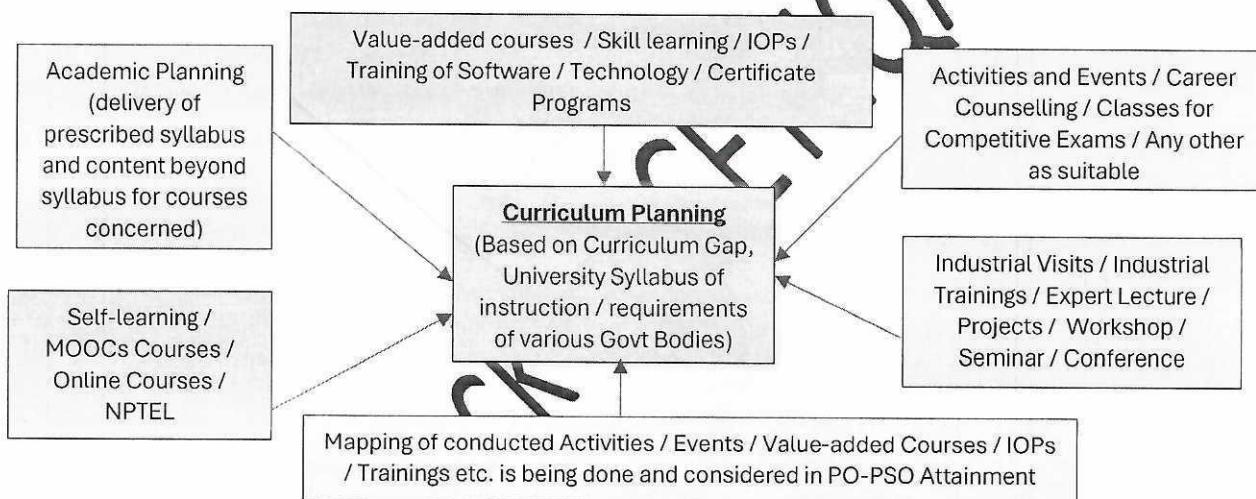
## 24. CURRICULUM GAP

Curriculum gap (to be communicated to the affiliating university) can also be identified by following (in addition to existing / adopted methods) :



## 25. CURRICULUM PLANNING

Based on this, entire academic delivery / curriculum is planned (course related contents are added in content beyond syllabus / topics, through DAC) that majorly included :



**NOTE :** The methods mentioned in this document are suggested ones. There may be more methods in use. So, each department is requested to read this document carefully and may use as reference. Further, department can update the concerned methods – that must be suitable and in use / acceptable to NBA / NAAC expert committee members. The updating must be approved by concerned DAC and IQAC.

(Dr. Brijesh Singh)  
Director (Officiating)

*Draft*

**Copy for information and necessary action to :**

1. Hon'ble Chairman and CEO sir
2. All the Deans and HODs, COE
3. IQAC, Registrar, ERP, Accounts, Library



## 11. PROCESS TO EVOLVE PEOs / PSOs

