CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY

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Outcome Based Education (OBE) Manual
(Certain Guidelines)

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INDEX

1. OBE OVERVIEW

Outcome Based Education (OBE) is an educational model that forms the base of a quality education system. There is no single specified style of teaching or assessment in OBE. All educational activities carried out in OBE should help the students to achieve the set goals. The faculty may adapt the role of instructor, trainer, facilitator, and/or mentor, based on the outcomes targeted.

OBE enhances the traditional methods and focuses on what the Institute provides to students. It shows the success by making or demonstrating outcomes using statements "able to do" in favor of students. OBE provides clear standards for observable and measurable outcomes.

Why OBE?

- International recognition and global employment opportunities.
- More employable and innovative graduates with professional and soft skills, social responsibility and ethics.
- Better visibility and reputation of the technical institution among stakeholders.
- Improving the commitment and involvement of all the stakeholders.
- Enabling graduates to excel in their profession and accomplish greater heights in their careers.
- Preparing graduates for the leadership positions and challenging them and making them aware of the opportunities in the technology development.

Benefits of OBE

- **Clarity:** The focus on outcome creates · a clear expectation of what needs to be accomplished by the end of the course.
- **Flexibility:** With a clear sense of what needs to be accomplished, instructors will be able to structure their lessons around the students' needs.
- **Comparison:** OBE can be compared across the individual, class, batch, program and institute levels.
- **Involvement:** Students are expected to do their own learning. Increased student involvement allows them to feel responsible for their own learning, and they should learn more through this individual learning.

India, OBE and Accreditation

From 13th June 2014, India has become the permanent signatory member of the Washington Accord. Implementation of OBE in higher technical education also started in India. The National Assessment and Accreditation Council (NAAC) and National Board of Accreditation (NBA) are the autonomous bodies for promoting global quality standards for technical education in India. NBA has started accrediting only the programs running with OBE from 2013.

The National Board of Accreditation mandates establishing a culture of outcome based education in institutions that offer Engineering, Pharmacy, Management program. Reports of outcome analysis help to find gaps and carryout continuous improvements in the education system of an Institute, which is very essential.

2. VISION, MISSION, QUALITY POLICY AND CORE VALUES OF INSTITUTE

Vision of Institute

To be the center of excellence in technical education and research.

Mission of Institute

To address the emerging needs through quality technical education and advanced research.

Quality Policy of Institute

Chaitanya Bharathi Institute of Technology (A) imparts value based Technical Education and Training to meet the requirements of Students, Industry, Trade /Profession, Research and Development Organizations for Self-sustained growth of Society.

Core values

- Academic integrity and accountability.
- Equal Opportunities to all.
- No Gender biasness.
- Healthy and Pleasant ambiance for effective teaching learning process.
- Respect individual differences and dignity of labor.
- Promote creativity, innovation, team spirit and healthy competition in all activities.
- Sharing of experience, knowledge and skills.
- Appreciation of intellectual excellence and creativity.
- Willingness to explore new ideas.

3. PROGRAM OUTCOMES (POs)

COMMON PROGRAM OUTCOMES (POs)

PO1 **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 **Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 **Design/Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 **Conduct Investigations of Complex Problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 **Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 **The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 **Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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

PO10 **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 **Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 **Life-long Learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

4. OBE FRAMEWORK OF THE INSTITUTE

The adoption of OBE framework of the institute is shown below:

I. Before Start of Semester

- Competency Matrix
- Subject Preference form
- Subject Allotment by HoD

  (Based on Competency)
- Subject confirmation by faculty
- Curriculum, Lesson Plan, Course file, Authentication by HoD

II. During Semester

- Verification of Course file/Lesson plan
- Approve & allow to teach
- Identifying student competency & action taken
- Execution of all other activities

III. Till End of Semester

- Implementation & Verification in classrooms and labs
- If any difficulty faced, Resolve with Subject Expert/Program Coordinator/HoD
- Assessment and Evaluation, CO-PO attainments & analysis
- Submission of Analysis to Program Coordinator/HoD

5. REVISED BLOOM'S TAXONOMY (BT)

Bloom's taxonomy is considered as the global language for education. Bloom's Taxonomy is frequently used by teachers in writing the course outcomes as it provides a readymade structure and list of action verbs. A summary of Anderson and Krathwohl's revised version of Bloom's taxonomy of critical thinking is provided in below Figure 1:

create — Produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate

evaluate — Justify a stand or decision
appraise, argue, defend, judge, select, support, value, critique, weigh

analyze — Draw connections among ideas
differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test

apply — Use information in new situations
execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch

understand — Explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

remember — Recall facts and basic concepts
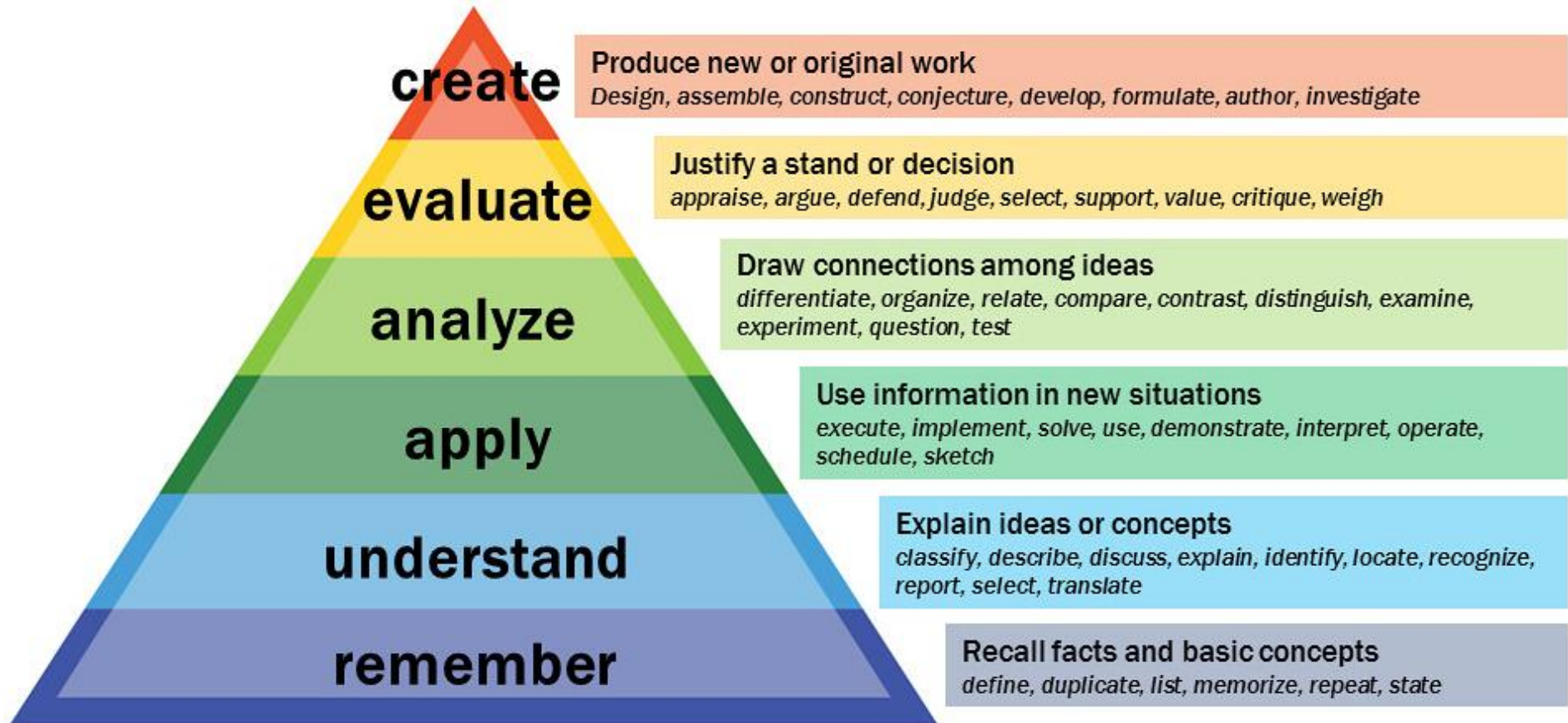define, duplicate, list, memorize, repeat, state

Figure 1: Revised version of Bloom's taxonomy

REVISED BLOOM'S TAXONOMY (BT)

Definitions of the different levels of thinking skills in Bloom's taxonomy:

1. Remember: Recalling relevant terminology, specific facts, or different procedures related to information and/or course topics. At this level, a student can remember something, but may not really understand it.

2. Understand: The ability to grasp the meaning of information (facts, definitions, concepts, etc.) that has been presented.

3. Apply: Being able to use previously learned information in different situations or in problem solving.

4. Analyze: The ability to break information down into its component parts. Analysis also refers to the process of examining information in order to make conclusions regarding cause and effect, interpreting motives, making inferences, or finding evidence to support statements/arguments.

5. Evaluate: Being able to judge the value of information and/or sources of information based on personal values or opinions.

6. Create: The ability to creatively or uniquely apply prior knowledge and/or skills to produce new and original thoughts, ideas, processes, etc. At this level, students are involved in creating their own thoughts and ideas.

REVISED BLOOM'S TAXONOMY (BT)

The cognitive process dimensions- categories					
Lower Order of Thinking (LOT)			Higher Order of Thinking (HOT)		
L1: REMEMBER	L2: UNDERSTAND	L3: APPLY	L4: ANALYSE	L5: EVALUATE	L6: CREATE
• Recognizing (identifying) • Recalling (retrieving)	• Interpreting • Illustrating • Classifying • Summarizing • Inferring (concluding) • Comparing • Explaining	• Executing • Implementing	• Differentiating • Organizing • Attributing	• Checking (coordinating, detecting, testing, monitoring) • Critiquing (judging)	• Planning • Generating • Producing (constructing)

The Knowledge Dimension			
Concrete Knowledge → Abstract knowledge			
FACTUAL	CONCEPTUAL	PROCEDURAL	METACOGNITIVE
• Knowledge of terminologies • Knowledge of specific details & elements	• Knowledge of classifications and categories • Knowledge of principles & generalizations • Knowledge of theories, models & structures	• Knowledge of subject specific skills and algorithms • Knowledge of subject specific techniques and methods • Knowledge of criteria for determining when to use appropriate procedures	• Strategic Knowledge • Knowledge about cognitive task, including appropriate contextual and conditional Knowledge • Self- Knowledge

6. ACTION VERBS FOR COURSE OUTCOMES

List of Action Words Related to Critical Thinking Skills:

Here is a list of action words that can be used when creating the expected student learning outcomes related to critical thinking skills in a course. These terms are organized according to the different levels of higher-order thinking skills contained in Anderson and Krathwohl's (2001) revised version of Bloom's taxonomy.

Here is the revised Bloom's document with action verbs, which we frequently refer to while writing Course Outcomes (COs) for our courses.

Sample Action Verbs for Course Outcomes (COs):

S. No.	BLOOM'S LEVEL	COGNITIVE LEVEL	ACTION VERBS
Lower Order of Thinking (LOT)			
1	L1: REMEMBER	Knowledge	Arrange Cite Define Describe Duplicate Identify Label List Memorize Match Name Order Outline Pronounce Quote Recall Recite Recognize Record Repeat Reproduce State Tabulate
2	L2: UNDERSTAND	Comprehension	Alter Classify Compare Convert Defend

S. No.	BLOOM'S LEVEL	COGNITIVE LEVEL	ACTION VERBS
			Describe
			Discuss
			Estimate
			Explain
			Express
			Extend
			Generalized
			Give examples
			Indicate
			Interpret
			Locate
			Paraphrase
			Recognize
			Rephrase
			Restate
			Reword
			Rewrite
			Select
			Summarize
			Translate
			Write
3	L3: APPLY	Application	Acquire
			Apply
			Calculate
			Change
			Chart
			Choose
			Compute
			Demonstrate
			Discover
			Dramatize
			Draw
			Employ
			Illustrate
			Interpret
			Manipulate
			Modify
			Operate
			Practice
			Prepare
			Produce
			Schedule
			Show
			Sketch
			Solve
			Use

S. No.	BLOOM'S LEVEL	COGNITIVE LEVEL	ACTION VERBS
	Higher Order of Thinking (HOT)		
4	**L4: ANALYZE**	**Analysis**	Analyze Appraise Ascertain Associate Breakdown Calculate Categorize Classify Compare Conclude Contrast Criticize Designate Determine Diagnose Diagram Differentiate Discriminate Distinguish Divide Examine Experiment Explain Explore Find Infer Investigate Outline Point out Question Reduce Relate Separate Specify Subdivide Test
5	**L5: EVALUATE**	**Evaluation**	Appraise Argue Assess Attach Choose Compare Conclude Criticize

S. No.	BLOOM'S LEVEL	COGNITIVE LEVEL	ACTION VERBS
			Critique
			Deduce
			Defend
			Estimate
			Evaluate
			Grade
			Judge
			Justify
			Measure
			Predict
			Prove
			Rate
			Recommend
			Reframe
			Review
			Support
			Test
			Value
			Weigh
6	L6: CREATE	Synthesis	Create
			Arrange
			Assemble
			Collect
			Combine
			Comply
			Compose
			Conceive
			Construct
			Create
			Derive
			Design
			Develop
			Devise
			Expand
			Extend
			Formulate
			Generalize
			Generate
			Integrate
			Invent
			Modify
			Organize
			Originate
			Plan
			Prepare
			Produce

S. No.	BLOOM'S LEVEL	COGNITIVE LEVEL	ACTION VERBS
			Project
			Rearrange
			Reconstruct
			Reorganize
			Revise
			Set up
			Synthesize

Illustration (use of action verb w.r.t knowledge dimension and order of thinking):

BLOOM'S LEVEL/ Use of Action Verbs	Factual	Conceptual	Procedural	Metacognitive
L1: REMEMBER	**List** properties of Soil.	**Recognize** characteristic of material.	**Explain** working of pump.	**Identify** strategies for report writing.
L2: UNDERSTAND	**Summarize** features of a new product.	**Classify** adhesives by toxicity.	**Explain** assembly instructions.	**Predict** the behaviour of member.
L3: APPLY	**Respond** to frequently asked questions.	**Provide** advice to team members.	**Carry** out pH tests of water samples.	**Use** modern techniques to get solution.
L4: ANALYSE	**Explain** the selection of tool/ activity.	**Differentiate** Lower Order of Thinking (LOT) and Higher Order of Thinking (HOT).	**Integrate** compliance with regulations.	**Assess** the project work.
L5: EVALUATE	**Select** the appropriate tool.	**Determine** relevance of results.	**Judge** efficiency of sampling techniques.	**Reflect** on one's progress.
L6: CREATE	**Generate** a log of daily activities.	**Assemble** a team of experts.	**Design** efficient project workflow.	**Create** a learning portfolio.

7. GUIDELINES FOR WRITING COURSE OUTCOME STATEMENTS

Well-written course outcomes involve the following parts:

- Action verbs

- Subject content

- Level of achievement as per BTL

- Modes of performing task

Illustration:

Students are able to

- <u>Design</u> column splices and bases. → Action verb (underlined)

- Determine the <u>losses in a flow system</u>. → Subject content

- Use structural analysis software <u>to a competent Level</u>. → Level of achievement

- <u>Present seminar</u> on real life problems. → Modes of performing task with action verb (underlined)

While writing COs the following questions/points must be addressed properly.

Specific	Is there a description of precise behavior and the situation it will be performed in? Is it concrete, detailed, focused and defined?
Measurable	Can the performance of the outcome be observed and measured?
Achievable	With a reasonable amount of efforts and application can the outcome be achieved? Are you attempting too much?
Relevant	Is the outcome important or worthwhile to the learner or stakeholder? Is it possible to achieve this outcome?
Time-Bound	Is there a time limit, rate, number, percentage or frequency clearly stated? When will this outcome be accomplished?

8. QUALITY OF COURSE OUTCOMES

Guidelines/Checklist for COs:

Number of COs	4 to 6
CO Essentials	Action Verb, Subject Content, Level of Achievement, Modes of Performing task (If Applicable)
Based on BTL	Understand, Remember, Apply, Analyse, Evaluate, Create
Number of BTL Considered in one course	Minimum 3
Technical Content/ point of curriculum	All curriculum contents are covered
Curriculum gap	Additional CO for gap identified/filling. Adds more weightage

9. CO-PO MAPPING GUIDELINES

CONSIDER ANY TWO MINIMUM CRITERIA FOR CO-PO MAPPING JUSTIFICATION:

A) Contact Hours: Lectures, Tutorials and Practicals

Level	Contact Hours in Percentage (including Lecture, Tutorial & Practical)
No mapping (-)	< 5%
Low (1)	5- 15%
Medium (2)	15- 25%
High (3)	>25%

Description:

Number of Lectures = 3per week x 16 weeks = 48 Hours

Tutorial = 1Hr x 16 Weeks = 16 Hours

Practical = 2Hr x 16 Week = 32 Hours

Total Hrs = 48+16+32 = 96 Hrs

Example: Let, CO1 related points are engaged in 10 Lectures + 1 Tutorial and 2 Practical Hours

Then contact hours = 10+1+2x2 = 15 hours

Therefore, contact hours in percentage = (15/96) x 100 = 15.65 %. Medium mapping (2)

B) Number of Assessment Tools used

Level	Assessment tools used to assess the CO
No mapping (-)	0
Low (1)	1 or 2
Medium (2)	3
High (3)	4 or more

Assessment tools are in place for computing Direct Attainment of Theory Courses, Laboratory Courses, Projects and Seminar Courses:

Theory Courses
- Class Tests
- Slip Tests
- Semester End Examination

Lab Courses
- Continuous monitoring in regular lab sessions (Lab Courses)
- Internal Lab Examination
- Lab Semester End Examination

Projects
- Mini Projects
- Major Project CIE
- Major Project SEE

Seminars
- Project Seminar
- Technical Seminar

Assessment tools used for Indirect Attainment:
- Course End Surveys

Every CO must be correlated with each PO and appropriate mapping may be selected.

C) Keywords

Level	Keywords Used in writing COs
No mapping (-)	Key words related with LOT and not related with course or any outcomes.
Low (1)	Part of PO is reflected through keywords/action verbs.
Medium (2)	Major part of PO is reflected through keywords/action verbs and moderate level performance is expected from student to achieve PO.
High (3)	Exact action verb of PO and critical performance expected from student to achieve PO.

D) Critical Assessment Record for PO5 to PO12

Level	Assessment Depth
No mapping (-)	No rubric used for assessment.
Low (1)	Single rubric category used for assessment.
Medium (2)	Two rubric category used for assessment.
High (3)	Three or more rubric category used for assessment.

Illustration:

Category No.	Rubric Category	Level of Performance			
		4	**3**	**2**	**1**
1	**Group Leader**	Seeks opportunities to lead; while leading is attentive to each member	Will take lead if group insists; not good at being attentive to each member.	Resists taking on leadership role; while leading allows uneven contributions.	Never shows Up.
2	**Contribution**	Always contributes; quality of contributions is exceptional.	Sometimes contributes; quality of contributions is fair.	Rarely contributes; contributions are often peripheral or irrelevant; frequently misses team sessions.	Never shows up and never contributes.
3	**Cooperation**	Always Cooperative with all members, support good initiatives.	Cooperative with members, but sometimes argue.	Cooperative with few members, and argue most of time.	Non cooperative.

E) Assessment Type

Level	Assessment Depth
No mapping (-)	Test items (1) OR Nil
Low (1)	Test items (2) OR Assessment item (1)
Medium (2)	Test items (2) + Assessment item (1) OR Assessment item (2)
High (3)	Test items (2) + Assessment item (2) and More

Test Item:
- Class Tests
- Slip Tests
- Semester End Examination

Assessment Items:
- Quizzes
- Assignment problems
- Simulation
- Laboratory experiments
- Project, field work and report presentation
- Tutorials, activities & etc.

F) Any other criteria with proper justifiable document is acceptable.

10. ATTAINMENT OF COURSE OUTCOMES (COs)

Course Outcomes (CO) attainment:

Course Attainment is the sum of Direct Attainment and Indirect Attainment. Direct Attainment is computed based on the marks obtained by students in the respective Assessment Tools and Indirect Attainment is computed from the Course End Survey.

Assessment Tools to compute CO-PO/PSO attainment is as follows - Sample: R16 Regulations:

The tools used are described in the below table:

S. No.	Assessment Tool	Description of the Assessment Tool	Evaluation	Quality of the Assessment Tool
Assessment tools are in place for computing Direct Attainment of Theory Courses, Laboratory Courses, Projects and Seminar Courses				
I. THEORY COURSES				
1.	Class Tests	• Two class tests are conducted, first class test in the 8th week of class work covering first half of the syllabus and second class test towards the end of the Semester covering last half of the syllabus. • Each class test is for a duration of 1 hour and for a total of 20 marks • Consists of Part –A and Part-B, all the questions of Part A are compulsory, typically consists of three questions and in Part B there is a choice where the student is supposed to attempt two questions out of three. • Part A is for 6 marks and Part-B is for 14 marks.	Average of both class tests is considered in CIE for 20 marks.	• Due weightage is given to all the CO's covered by the portionmeant for each Class Test. • Each CO to which the Question belongs to is mentioned along with Blooms taxonomy level. • Course Expert Groups along with its team validates the Question paper to ensure the desired standard from outcome attainment perspective as well as learning levels perspective.

S. No.	Assessment Tool	Description of the Assessment Tool	Evaluation	Quality of the Assessment Tool
2.	Slip Tests	Three slips tests are conducted: • First slip test in the 5th week • Second slip test in 12th week and • Third slip test in 15th week of the Semester.	Each slip test carries 10 marks and average of best two slip tests is considered in CIE for 10 Marks.	• Due weightage is given to all theCO's covered by the portionmeant for each slip test. • Each CO to which the Question belongs to is mentioned • Course Expert Groups along with its team validates the Slip test questions to ensure the desired standard from outcome attainment perspective as well as learning levels perspective.
3.	Semester End Examination	The End examination is for 70 marks, where Part-A is compulsory with 10 questions, two from each unit and Part – B consists of 7 questions out of which 5 questions must be attempted by students. Part-A is for 20 marks and Part-B is for 50 marks.	• Appointed Chief Examiner prepares the key and discusses with the examiners on how to evaluate • Once the examiners evaluates all the allotted answer scripts, Chief examiner randomly checks 10% of the scripts.	• External Paper is set by course experts from other Institutions • Course Coordinators / Course Experts moderates the question paper and verifies / identifies CO. • CoE instructs the Papers setters to ensure due coverage of Blooms taxonomy levels in the questions given.
		II. LABORATORY COURSES		
4.	Continuous monitoring in regular lab sessions	Every student is evaluated for 10 marks in every lab session. The rubric parameters include Record submission, Write up of the program, Execution and Viva.	Average of weekly performance is considered.	Due care is taken and CEG validates whether the evaluation is done as per therubrics periodically.

S. No.	Assessment Tool	Description of the Assessment Tool	Evaluation	Quality of the Assessment Tool
5.	**Internal Lab Examination**	Two Lab internals are conducted, first lab internal after 8weeks of class work and second Lab internal towards theend of the Semester. Each lab internal is conducted for 15marks. The rubric parameters for evaluation include Write-Up, Record, Viva and Execution.	Average of both lab internals is considered.	Coverage of all the programmes from thesyllabus is ensured by CEG.
6.	**Lab Semester End Examination**	The End Examination is conducted for 50 marks, the rubric parameters for evaluation include Record, Write-Up, Execution, Results and Viva-Voce.	External Examiner and Internal Examiner together will evaluate the students.	Internal Examiner and External Examiners will prepare the Question Paper.
		III. PROJECT WORK		
7.	**Mini Projects**	• Students are encouraged to take up projects in the subjects that are covered in the current semester. Students will design, implement and analyse the results. They also prepares and submits a report. • Every teams progress is monitored every week and student is evaluated for 10 marks in every lab session. • To ensure attainment of higher levels of Blooms Taxonomy Mini projects are planned. • To ensure students work as individuals and as a member or leader in diverse teams, and in multidisciplinary settings.	• Weekly performance is considered • Two Internal project reviews are conducted andaverage of these two reviews are considered. • Rubric parameters for evaluation include PPT preparation, presentationand Question & Answers	CEG ensures the quality of the Mini Projects

8.	**Major Project CIE**	• Evaluation by Department Review Committee:
		  o Review 1: 5Marks
		  o Review 2: 8 Marks
		  o Submission: 12 marks
			• Project supervisor will monitor the progress of the project on aweekly basis and the suggestions are advised to	• Guides review the progress of the work on weekly basis to ensure quality work that results in a paper publication

S. No.	Assessment Tool	Description of the Assessment Tool	Evaluation	Quality of the Assessment Tool

		• Evaluation by Supervisor:
		  o Regularity and Punctuality: 05 Marks
		  o Work Progress: 05 Marks
		  o Quality of the work which may lead to publications: 05 Marks
		  o Report Preparation: 05 Marks
		  o Analytical / Programming / Experimental Skills: 05 Marks
			students which are recorded in the weekly status report.
			• Project coordinator will collect status reports from the students duly signed by the supervisor for continuous monitoring.
			• The DRC Panel reviews the progress of the projects four times before external evaluation.
				• Project Panel's review and give suggestions to teams based on their presentation in the internal review

9.	Major Project SEE	Evaluation by External and Internal Examiners:
		• Power Point Presentation: 20 Marks
		• Thesis Evaluation: 40 Marks
		• Quality of the project: 20 Marks
		  o Innovations
		  o Applications
		  o Live Research Projects
		  o Scope for future study
		  o Application to society
		• Viva-Voce: 20 Marks
			• Internal Examiner along with the External Examiner evaluates the External Project Presentations based on the rubrics	• Projects are categorized as application based, product based and research based.
				• Students are encouraged to publish their work in Journals / Conferences
				• Students involved in Research based project work are advised to apply for IPR

		IV. SEMINARS		
10.	Project Seminar	• In VII Semester student teams with the help of their faculty guides decides the project, review the literature and presents the work in Project Seminar • The Evaluation guidelines are as follows: • Supervisor evaluates for 25 Marks that includes	• Faculty guide periodically monitors the progress • Department Committee evaluates the performance of the team	• Faculty guides will provide guidance at every step right from project selection, identification of standard and latest base papers, thorough review of literature, preparation of seminar report and

S. No.	Assessment Tool	Description of the Assessment Tool	Evaluation	Quality of the Assessment Tool

		o Project Status / Review - 20 Marks
		o Report Submission - 5 Marks
		● Department Committee evaluates for 25 Marks
		  o Relevance of the Topic - 5 Marks
		  o PPT Preparation - 5 Marks
		  o Presentation - 5 Marks
		  o Question and Answers - 5 Marks
		  o Report Preparation - 5 Marks
				presentation
				● CEG in association with the Project Coordinator ensures that no project is repeated and students choose expert faculty guides from the domain of their interest

11.	Technical Seminar	● In VIII Semester students will give a 15 minute seminar on the latest trends of the IT sector.
		● Technical seminar panel evaluates the student presentation based on the below rubrics:
		  o Contents and relevance – 10 Marks
		  o Presentation skills - 10 Marks
		  o Preparation of PPT slides - 05 Marks
		  o Questions and answers - 05 Marks
		  o Report in a prescribed format - 20 Marks
			Technical Seminar Panel evaluates the performance of individual students.	Panelists will guide the students in selecting the technical seminar topic without overlap, identification of standard base papers, preparation of seminar report and presentation.

Assessment tools used for Indirect Attainment				
12.	Course End Surveys	End of the Semester Course End Survey is collected in a confidential manner.	Average of the student's responses for each CO is considered.	Student's perception about how far they are able to attain the Course Outcomes is collected.

Course Outcomes (CO) Direct Attainment Levels - Sample: R16 Regulations

S. No.	Assessment Tool	Maximum marks	Threshold level (%)	Attainment level Criteria	Attainment level
1	*Theory* CIE (Class Tests & Slip Tests)	20+10 = 30	50%	At least 80% of students scoring more than 15 marks (50% of 30 marks is 15) out of the maximum (30) marks.	3
				At least 70% of students scoring more than 15 marks (50% of 30 marks is 15) out of the maximum (30) marks.	2
				At least 60% of students scoring more than 18 marks (50% of 30 marks is 15) out of the maximum (30) marks.	1
2	*Theory* Semester End Examination (SEE)	70	40%	At least 60% of students scoring pass marks (28 or >28 out of 70) in the University final examination.	3
				At least 50% of students scoring pass marks (28 or >28 out of 70) in the University final examination.	2
				At least 40% of students scoring pass marks (28 or >28 out of 70) in the University final examination.	1
3	*Laboratory* CIE	25	50%	At least *80%* of students scoring more than 12.5 marks (50% of 25 marks is 12.5) out of the maximum (25) marks.	3
				At least 70% of students scoring more than 12.5 marks (50% of 25 marks is 12.5) out of the maximum (25) marks.	2
				At least *60%* of students scoring more than 12.5 marks (50% of 25 marks is 12.5) out of the maximum (25) marks.	1

S. No.	Assessment Tool	Maximum marks	Threshold level (%)	Attainment level Criteria	Attainment level
4	*Laboratory* Semester End Examination (SEE)	50	50%	At least 70% of attempted students exceed threshold level (50%) marks i.e >= 25 marks	3
				At least 60% of attempted students exceed threshold level (50%) marks i.e >= 25 marks	2
				At least 50% of attempted students exceed the threshold (50%) marks i.e >= 25 marks	1
5	Major Project - CIE	50	50%	At least *80%* of students scoring more than or equal to 25 marks (50% of 50 marks is 25) out of the maximum (50) marks.	3
				At least 70% of students scoring more than or equal to 25 marks (50% of 50 marks is 25) out of the maximum (50) marks.	2
				At least *60%* of students scoring more than or equal to 25 marks (50% of 50 marks is 25) out of the maximum (50) marks.	1
6	Major Project - SEE	100	50%	At least 70% of attempted students exceed threshold level (50%) marks i.e >= 50 marks.	3
				At least 60% of attempted students exceed threshold level (50%) marks i.e >= 50 marks.	2
				At least 50% of attempted students exceed the threshold level (50%) marks i.e >= 50 marks.	1

S. No.	Assessment Tool	Maximum marks	Threshold level (%)	Attainment level Criteria	Attainment level
7	Project Seminar (only CIE)	50	50%	At least 80% of students scoring more than or equal to 25 marks (50% of 50 marks is 25) out of the maximum (50) marks.	3
				At least 70% of students scoring more than or equal to 25 marks (50% of 50 marks is 25) out of the maximum (50) marks.	2
				At least 60% of students scoring more than or equal to 25 marks (50% of 50 marks is 25) out of the maximum (50) marks.	1
8	Seminar (only CIE)	50	50%	At least 70% of attempted students exceed threshold level (50%) marks i.e >= 25 marks.	3
				At least 60% of attempted students exceed threshold level (50%) marks i.e >= 25 marks.	2
				At least 50% of attempted students exceed the threshold level (50%) marks i.e >= 25 marks.	1

Computation of Course Outcomes (CO) Attainment - Sample: R16 Regulations

Course attainment is the sum of 80% of Direct Attainment (DA) and 20% of Indirect Attainment (IA).

Assessment Pattern:

Assessment Type	Assessment Tool
Direct Attainment (DA)	*CIE*
	Class Test-1
	Class Test-2
	Slip Test-1
	Slip Test-2
	Slip Test-3
	Semester End Examination (SEE)
Indirect Attainment (IA)	Course End Surveys

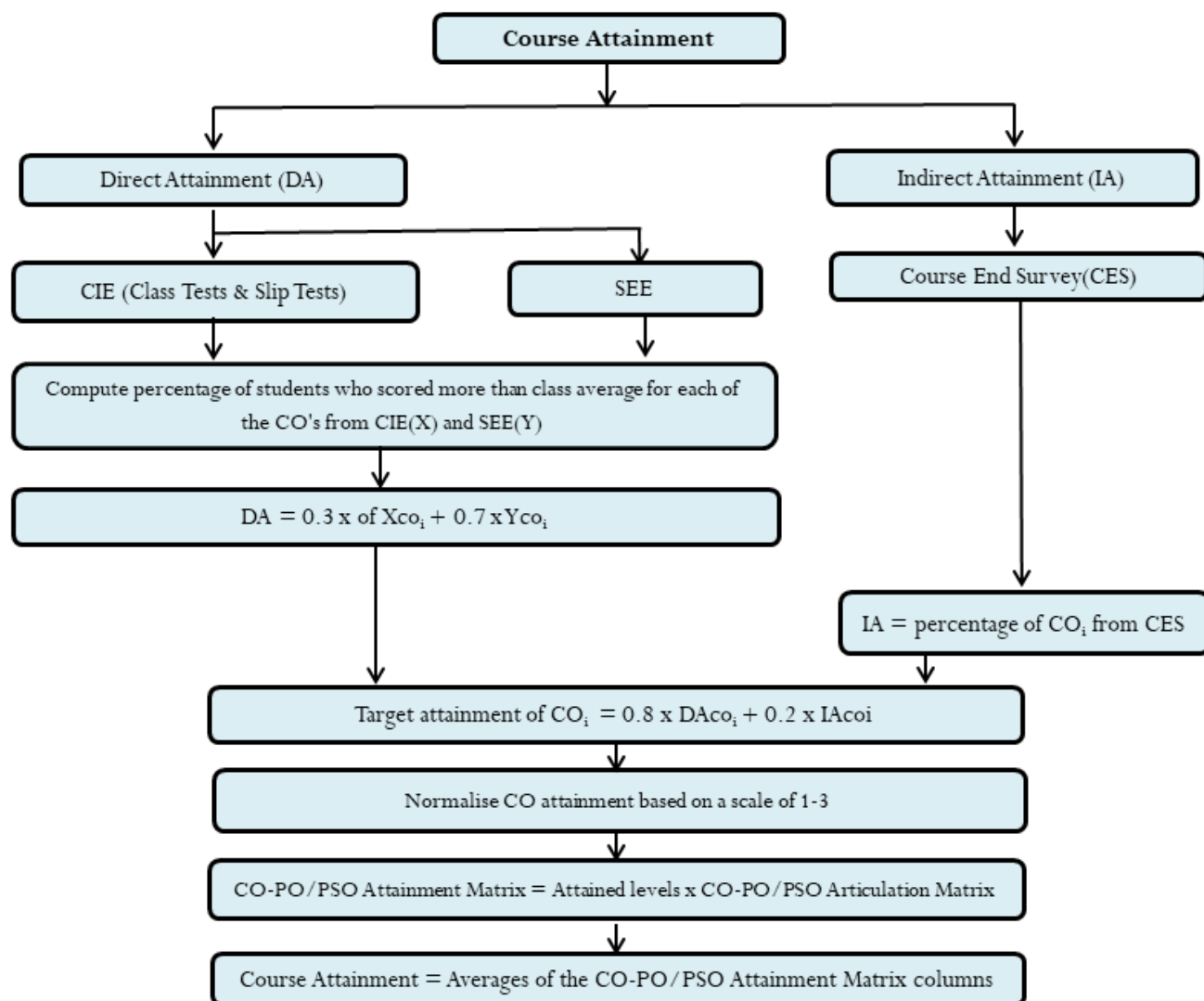CO-PO/PSO attainment for a course is computed as per the procedure given below:

Fig: Computation of CO-PO/PSO attainment for a course

Computation of CO Direct Attainment in the course:
Direct CO Attainment = 30% of CIE Average Attainment Level + 70% of SEE Average Attainment Level

Computation of CO Indirect Attainment in the course:
Indirect Attainment = ((Level1 x No. of Students Attempted) + (Level2 x No. of Students Attempted) + (Level3 x No. of Students Attempted))/ Total No. of Students

OVERALL CO Attainment in the course:
Computation of Attainment of COs in the course = 80% of Direct CO Attainment+ 20% of Indirect CO Attainment

11. ATTAINMENT OF PROGRAM OUTCOMES (POs) AND PROGRAM SPECIFIC OUTCOMES (PSOs)

For Direct Attainment of POs/PSOs course attainment is computed for all the courses that the batch has studied/opted and CO-PO/PSO attainment averages are obtained for all the Courses. The Course-PO/PSO attainment matrix is prepared by arranging the Course-PO/PSO attainment of all the courses in a table. Individual Course-PO/PSO attainments are obtained by taking the average of the respective columns of Course-PO/PSO attainment matrix.

Evaluations of attainment of POs and PSOs based on 80% of Direct Attainment (DA) + 20% of Indirect Attainment (IA) combined to arrive at the Final Evaluation.

Indirect Attainment is computed using the tools including i. Program Exit Survey, ii. Employer Survey, iii. Co-Curricular Activities and iv. Extra-Curricular activities.

- Program Exit Survey is collected from the students of that batch immediately after their graduation.

- Employer Survey is collected from the corporate companies which recruit students in big numbers.

- Indirect attainment through Co-Curricular activities is computed through student achievements which include paper presentations, project presentations, coding competitions, participation in seminars / workshops / Guest Lectures / Keynote addresses and internships.

- Indirect attainment through extracurricular activities is computed through student achievements which include NSS, College Newsletter, Event coordination, Cultural Activities, Sports.
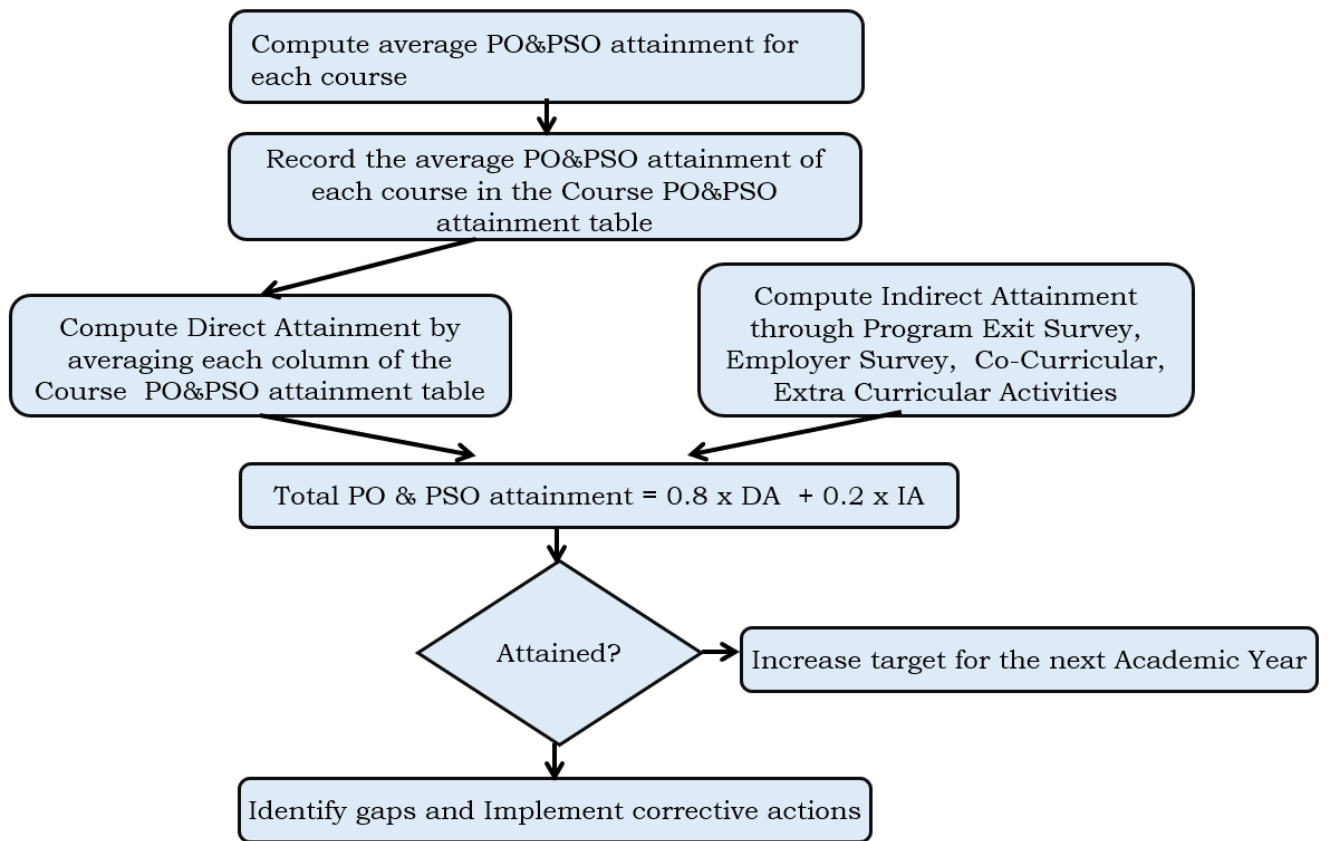
PO/PSO attainment is computed as follows:

```
┌─────────────────────────────────────┐
│ Compute average PO&PSO attainment    │
│ for each course                      │
└─────────────────────────────────────┘
                │
                ▼
┌─────────────────────────────────────┐
│ Record the average PO&PSO attainment │
│ of each course in the Course PO&PSO  │
│ attainment table                     │
└─────────────────────────────────────┘
```

Compute Direct Attainment by averaging each column of the Course PO&PSO attainment table

Compute Indirect Attainment through Program Exit Survey, Employer Survey, Co-Curricular, Extra Curricular Activities

Total PO & PSO attainment = 0.8 x DA + 0.2 x IA

Attained?

Increase target for the next Academic Year

Identify gaps and Implement corrective actions

Fig: Computation of PO/PSO attainment

12. REFERENCES

1. https://www.nbaind.org/files/obe-and-nba-accreditation.pdf

2. https://www.aicte-india.org/sites/default/files/FINAL%20BEST%20PRACTICES%20IN%20AICTE%20APPROVED%20INSTITUTUIONS.pdf

3. https://www.aicte-india.org/sites/default/files/ExaminationReforms.pdf

4. https://www.ugc.ac.in/pdfnews/4598476_LOCF-UG.pdf