



ASSESSMENT MANUAL

R19 REGULATION



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE
AMALAPURAM

2020

1. INTRODUCTION

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

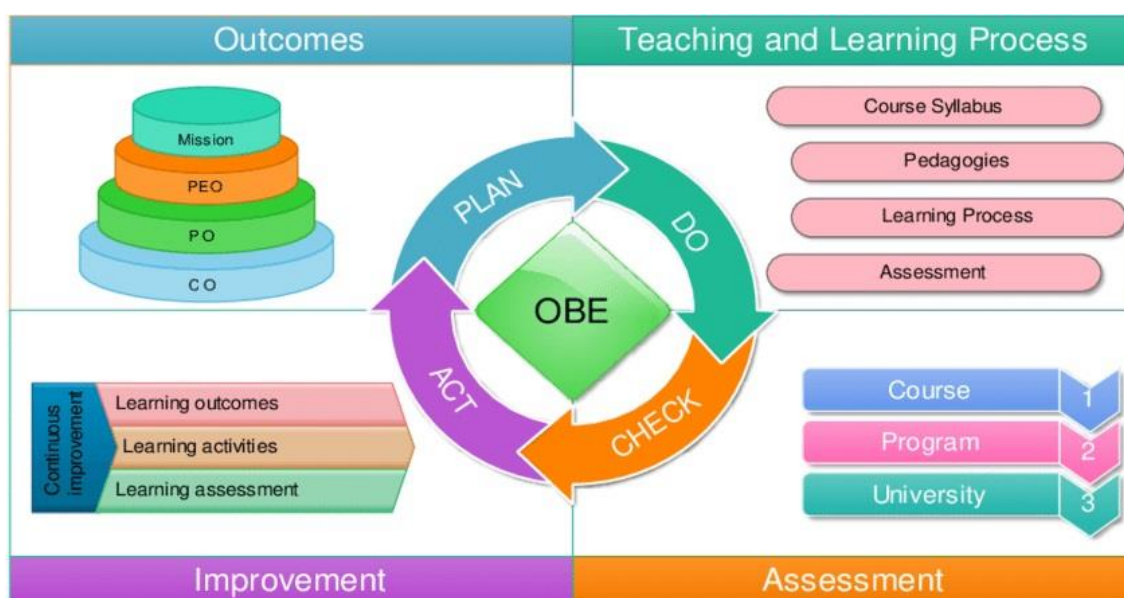
- **Clarity:** The focus on outcome creates a clear expectation of what needs to be accomplished by the end of the course.
- **Flexibility:** With a clear sense of what needs to be accomplished, instructors will be able to structure their lessons around the students' needs.
- **Comparison:** OBE can 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.

FEATURES OF OBE

OBE is an educational process that focuses on what students can do or the qualities they should develop after they are taught.

OBE involves the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of higher order learning and mastery rather than accumulation of course credits.

- Both structures and curricula are designed to achieve those capabilities or qualities.
- Discourages traditional education approaches based on direct instruction of facts and standard methods.
- It requires that the students demonstrate that they have learnt the required skills and content.



EXPECTATIONS OF STUDENTS UNDER OBE – THE OUTCOME

- Students are expected to be able to do more challenging tasks other than memorize and reproduce what was taught.
- Students should be able to: write project proposals, complete projects, analyze case studies, give case presentations, show their abilities to think, question, research, and make decisions based on the findings.
- Be more creative, able to analyze and synthesize information.
- Able to plan and organize tasks, able to work in a team as a community or in entrepreneurial service teams to propose solutions to problems and market their solutions.

- Students should be enriched on three dimensional scales of knowledge, skill and attitude throughout the course or programme.

INSTITUTE VISION AND MISSION

Vision

To be a Premier Institution in Education and Research, producing global leaders in Engineering, Technology and Management

Mission

- IM 1.** Imparting quality and outcome-based education towards academic excellence
- IM 2.** Inculcating team spirit and professional ethics among stakeholders.
- IM 3.** Strengthening links with industry through internships and collaborative development works.

DEPARTMENT VISION AND MISSION

Vision

To become a prominent department of Computer Science & Engineering producing competent professionals with research and innovation skills, inculcating moral values and societal concerns.

Mission

- DM 1.** To offer state-of-art education in Computer Science and Engineering.
- DM 2.** To provide strong theoretical foundation complemented with extensive practical training.
- DM 3.** To train and transform young men and women into responsible thinking engineers, technologists and scientists, to motivate them to attain professional excellence.
- DM 4.** To inspire students proactively engage themselves for the betterment of the society.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1 Graduates will be an efficient software developer in diverse fields and will be a successful professional and/or pursue higher studies.

PEO 2 Graduates will be capable to adapt to new computing technology for professional excellence and research and be a lifelong learner.

PEO 3 Graduates will work productively exhibiting ethical qualities for the betterment of society.

PEO 4 Graduates will possess leadership qualities, work harmoniously as a team member with effective communication skills.

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, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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

PO4 CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 MODERN TOOL USAGE: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6 THE ENGINEER AND SOCIETY: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 ENVIRONMENT AND SUSTAINABILITY: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

PO9 INDIVIDUAL AND TEAM WORK: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1 Gain capability to use current techniques, skills & tools necessary for carrying out multidisciplinary projects.

PSO 2 Acquaint with the contemporary trends in industrial/research setting and thereby innovate novel solutions to existing problems.

OBE FRAMEWORK OF THE INSTITUTE

The adoption of OBE framework

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 PAQIC/HoD

REVISED BLOOM'S TAXONOMY (RBT)

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:

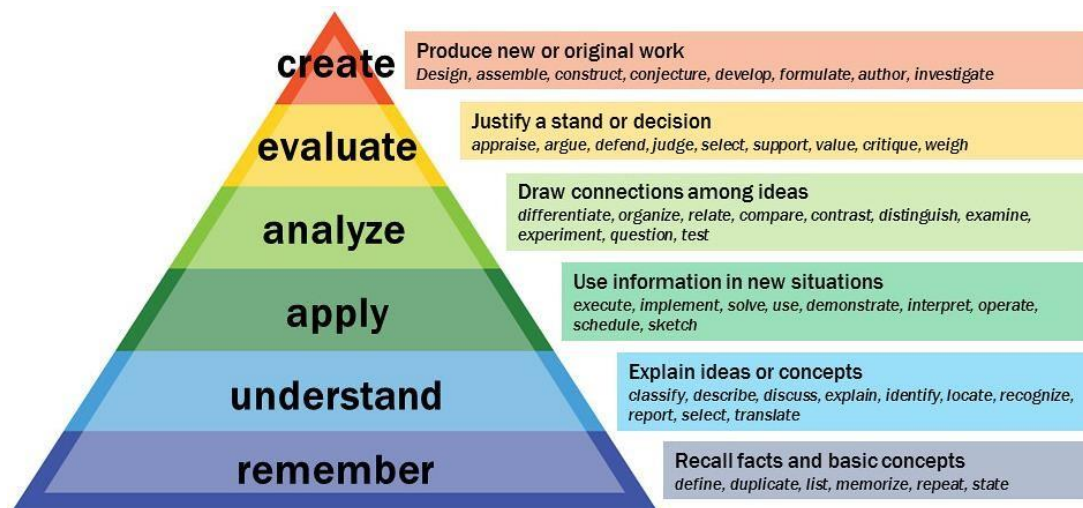


Fig.1: Revised Bloom's Taxonomy of Critical Thinking

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

- **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.
- **Understand:** The ability to grasp the meaning of information (facts, definitions, concepts, etc.) that has been presented.
- **Apply:** Being able to use previously learned information in different situations or in problem solving.
- **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.
- **Evaluate:** Being able to judge the value of information and/or sources of information based on personal values or opinions.
- **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.

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
<ul style="list-style-type: none"> • Recognizing (identifying) • Recalling (retrieving) 	<ul style="list-style-type: none"> • Interpreting • Exemplifying • Classifying • Summarizing • Inferring (concluding) • Comparing • Explaining 	<ul style="list-style-type: none"> • Executing • Implementing 	<ul style="list-style-type: none"> • Differentiating • Organizing • Attributing 	<ul style="list-style-type: none"> • Checking (coordinating, detecting, testing, monitoring) • Critiquing (judging) 	<ul style="list-style-type: none"> • Planning • Generating • Producing (constructing)

The Knowledge Dimension			
General Categories			
FACTUAL	CONCEPTUAL	PROCEDURAL	METACOGNITIVE
<ul style="list-style-type: none"> • Knowledge of terminologies • Knowledge of specific details & elements 	<ul style="list-style-type: none"> • Knowledge of classifications and categories • Knowledge of principles & generalizations • Knowledge of theories, models & structures 	<ul style="list-style-type: none"> • Knowledge of subject specific skills and algorithms • Knowledge of subject specific techniques and methods • Knowledge of criteria for determining when to use appropriate procedures 	<ul style="list-style-type: none"> • Strategic Knowledge • Knowledge about cognitive task, including appropriate contextual and conditional Knowledge • Self- Knowledge

The Knowledge Dimension			
Categories specific to Engineering			
FUNDAMENTAL DESIGN CONCEPTS	CRITERIA AND SPECIFICATIONS	PRACTICAL CONSTRAINTS	DESIGN INSTRUMENTALITIES
<ul style="list-style-type: none"> Operational principles of devices and components within a device or system. 	<ul style="list-style-type: none"> Knowledge of translating the qualitative goals for the device into specific, quantitative goals. 	<ul style="list-style-type: none"> Knowledge of an array of less sharply defined considerations derived from experience in practice, considerations that frequently do not lend themselves to theorizing, tabulation, or programming into a computer. 	<ul style="list-style-type: none"> Procedural knowledge including the procedures, way of thinking, and judgmental skills by which it is done.

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.

L1	L2	L3	L4	L5	L6
REMEMBER	UNDERSTAND	APPLY	ANALYZE	EVALUATE	CREATE
Arrange Cite	Alter	Acquire	Analyze	Appraise	Create
Define	Classify	Apply	Appraise	Argue	Arrange
Describe	Compare	Calculate	Ascertain	Assess	Assemble
Duplicate	Convert	Change	Associate	Attach	Collect
Identify	Defend	Chart	Breakdown	Choose	Combine
Label	Describe	Choose	Calculate	Compare	Comply
List	Discuss	Compute	Categorize	Conclude	Compose
Memorize	Estimate	Demonstrate	Classify	Criticize	Conceive
Match Name	Explain	Discover	Compare	Critique	Construct

Order	Express Extend	Dramatize	Conclude	Deduce	Create
Outline	Generalized	Draw	Contrast	Defend	Derive
Pronounce	Give Examples	Employ	Criticize	Estimate	Design
Quote	Indicate	Illustrate	Designate	Evaluate	Develop
Recall	Interpret	Interpret	Determine	Grade	Devise
Recite	Locate	Manipulate	Diagnose	Judge	Expand
Recognize	Paraphrase	Modify	Diagram	Justify	Extend
Record	Recognize	Operate	Differentiate	Measure	Formulate
Repeat	Rephrase	Practice	Discriminate	Predict	Generalize
Reproduce	Restate	Prepare	Distinguish	Prove	Generate
State	Reword	Produce	Divide	Rate	Integrate
Tabulate	Rewrite	Schedule	Examine	Recommend	Invent
	Select	Show	Experiment	Reframe	Modify
	Summarize	Sketch	Explain	Review	Organize
	Translate	Solve	Explore	Support	Originate
	Write	Use	Find Infer	Test	Plan
			Investigate	Value	Prepare
			Outline	Weigh	Produce
			Point out		Project
			Question		Rearrange
			Reduce		Reconstruct
			Relate		Reorganize
			Separate		Revise
			Specify		Setup
			Subdivide		Synthesize
			Test		

GUIDELINES FOR WRITING COURSE OUTCOME STATEMENTS

What are Course Outcomes?

- Course Outcomes (COs) are what the student should be able to do at the end of a course
- It is an effective ability, including attributes, skills and knowledge to successfully carry out the identified activity
- The most important aspect of a CO is that it should be observable and measurable

Structure of a CO statement

Action: Represents a cognitive/ affective/ psychomotor activity the learner should perform. An action is indicated by an action verb, occasionally two, representing the concerned cognitive process(es).

Knowledge: Represents the specific knowledge from any one or more of the eight knowledge categories

Condition: Represents the process the learner is expected to follow or the condition under which to perform the action (This is an optional element of CO)

Criteria: Represent the parameters that characterize the acceptability levels of performing the action (This is an optional element of CO)

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?

Dos and Don'ts

- Use only one action verb

- Do not use words including ‘like’, ‘such as’, ‘different’, ‘various’ ‘etc.’ with respect to knowledge elements. Enumerate all the relevant knowledge elements.
- Put in effort to make the CO statement as detailed as possible, and measurable.
- Do not make it either too abstract or too specific

Check List

- ✓ Does the CO begin with an action verb?
- ✓ Is the CO stated in terms of student performance (rather than teacher performance or course content to be covered)?
- ✓ Is the CO stated as a learning product rather than as a learning process?
- ✓ Is the CO stated at the proper level of generality, and relatively independent of other COs?
- ✓ Is the CO attainable in the given context (students’ background, prerequisite competences, facilities, time available and so on)?

Number of COs for a Course

- Too small a number of COs do not capture the course in sufficient detail and may not serve instruction design that well.
- Too many COs make all the processes related to assessment design and computation of attainment of COs messy and demanding.
- A 3:0:0, 3:1:0 and 3:0:1 courses should have 5 or 6 course outcomes.

CO – PO Mapping Guidelines

Consider any Two Minimum Criteria for CO – PO Mapping Justification

- **Contact Hours: Lectures, Tutorials and Practical**

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 = $10+1+2 \times 2 = 15$ hours

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

- **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

CO ASSESSMENT PROCESS

CO Assessment process is done based on the performance of the student using Direct Method (MID exam, Assignment, Semester End Examination) and Indirect Method (Course Semester End Feedback)

For the assessment of Course Outcomes, 80% weightage is given to Direct Assessment and 20% weightage is given to Indirect Assessment.

List of Assessment Processes

Course Type	Direct Assessment Methods		Indirect Assessment Methods
	Internal	External	
Theory Course	<ul style="list-style-type: none"> ✓ Mid Examinations ✓ Assignment 	<ul style="list-style-type: none"> ✓ Semester End Examination 	<ul style="list-style-type: none"> ✓ Course End Feedback
Lab Course	<ul style="list-style-type: none"> ✓ Day – to – Day work ✓ Record ✓ Internal Examination 	<ul style="list-style-type: none"> ✓ Semester End Examination 	<ul style="list-style-type: none"> ✓ Course End Feedback
Engineering Graphics/Design/Drawing	<ul style="list-style-type: none"> ✓ Internal Examination 	<ul style="list-style-type: none"> ✓ Semester End Examination 	NA
Socially Relevant Project	<ul style="list-style-type: none"> ✓ Continuous Evaluation 	<ul style="list-style-type: none"> ✓ End Evaluation 	NA
Engineering Exploration Course	<ul style="list-style-type: none"> ✓ Continuous Evaluation 	<ul style="list-style-type: none"> ✓ End Evaluation 	NA
Mini Project	<ul style="list-style-type: none"> ✓ Continuous Evaluation 	<ul style="list-style-type: none"> ✓ End Evaluation 	NA
Project Work – Part I	<ul style="list-style-type: none"> ✓ Continuous Assessment ✓ Report 	<ul style="list-style-type: none"> ✓ End Evaluation 	NA

	✓ Internal Evaluation		
Project Work – Part II	✓ Continuous Assessment ✓ Report ✓ Internal Evaluation	✓ End Evaluation	NA

The Quality / Relevance of assessment processes & tools used

Theory Courses Evaluation

For theory subjects, during a semester, there shall be two mid-term examinations. Each mid term examination consists of (i) one online objective examination (ii) one descriptive examination and (iii) one assignment. The online examination (objective) and descriptive examination shall be for 10 marks each with a total duration of 1 hour 50 minutes (20 minutes for objective and 90 minutes for descriptive paper). The online examination (objective) is set with 20 multiple choice questions for 10 marks (20 questions x ½ marks) from first two and half units (50% of the syllabus) and it is conducted by University Examination Section. The descriptive examination is set with 3 full questions from first two and half units (50% of the syllabus), the student has to answer all questions. The second online examination shall be conducted on the rest of the syllabus. The assignment is given by the concerned class teacher for five marks from first two and half units (50% of the syllabus). The second assignment shall given from rest of the syllabus. The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination. The total marks secured by the student in each mid-term examination are evaluated for 25 marks. Internal marks can be calculated with 80% weightage for better of the two mid-term examinations and 20% Weightage for other mid-term examination.

Example:

Mid-1 marks = Marks secured in (online examination-1+descriptive examination-1+one assignment-1)

Mid-2 marks = Marks secured in (online examination-2+descriptive examination-2+one assignment-2)

Final internal Marks = (Best of (Mid-1/Mid-2) marks x 0.8 + Least of (Mid-1/Mid-2) marks x 0.2).

The semester end examinations will be conducted university examination section for 75 marks consists of five questions carrying 15 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an “either” “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

Direct Method:

Evaluation	Exam Mode	Max. Marks	Frequency	Duration
Internal	MID (Descriptive)	10	Twice per Semester	90 min.
	Objective Quiz (MCQ)	10	Twice per Semester	20 min.
	Assignment	5	Six per Course	-
	Internal Assessment (30 marks) = 80% of Best Mid Marks + 20% of the other Mid Marks			
External	Descriptive	75	Once per Semester	180 min.

Quality of the Assessment Tool

- Due weightage is given to all the CO's covered by the portion meant for each internal examination.
- Each CO to which the Question belongs to is mentioned along with Blooms taxonomy level.
- Course coordinator along with its team validates the Question paper to ensure the desired standard from outcome attainment perspective as well as learning levels perspective.

Laboratory Course Evaluation

For practical subjects there shall be continuous evaluation during the semester for 20 internal marks and 30 end examination marks. The internal 20 marks shall be awarded as follows: day to day work - 5 marks, Record-5 marks and the remaining 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner appointed by controller of examinations, JNTUK.

Direct Method:

Evaluation	Exam Mode	Max. Marks	Frequency	Duration
Internal	Day – to – Day work	5	Once per Experiment	150 min.
	Laboratory Record	5	Once per Experiment	
	Internal Exam	10	Once per Semester	180 min.
External	End Exam	30	Once per Semester	180 min.

Rubrics used for laboratory Course

Parameters	Allocated Marks	Poor	Average	Good
Preparation & Execution	3	Students observation book preparation is insufficient and not executed	Students observation book preparation is Fair and partially executed	Students observation book preparation is Good and completely executed
		0-1Mark	2Marks	2-3Marks
Viva-Voce	2	No sufficient basic knowledge of the experiment	Demonstrating and understanding of the experiment	Demonstrating and good understanding of the experiment
		0 Mark	1 Mark	2 Marks

Rubrics used for laboratory Record

Parameters	Allocated Marks	Poor	Average	Good
Record	5	Insufficient implementation of the content	Implementation of the content is fair but fail to produce the correct outputs	Good implementation of the content and had written the correct outputs
		0-1 Mark	2-3 Mark	3-5 Mark

Rubrics used for Laboratory Internal Examination

Parameters	Allocated Marks	Poor	Average	Good
Procedure write up	3	Student was unable to write procedure	Student was able to write the procedure but unable to execute	Student was able to write the procedure and also able to execute
		0-1 Mark	1-2 Mark	2-3 Mark
Execution	3	Not executed	Partially executed	Completely

				executed
		0-1 Mark	1-2 Mark	2-3 Mark
Viva-voce	4	No sufficient basic knowledge of the experiment	Demonstrating and understanding of the experiment	Demonstrating good understanding of the experiment
		0-1 Mark	1-3 Mark	3-4 Mark

CO Assessment Process for Engineering Drawing

Direct Method:

Evaluation	Method	Max. Marks	Frequency	Duration
Internal	Day-to-Daywork	15		
	Internal Test	10	Twice per semester	90Minutes
	Internal assessment(30marks)=80% of Best Mid+20% of other Mid			
External	Exam	75	Once per semester	3Hours

Socially Relevant Project

There shall be continuous evaluation during the semester for 20 internal marks and 30 external marks.

Internal Evaluation (20 Marks): Two internal evaluations in the form of presentations (First one before I Mid-term and Second one before the II-Mid-term examinations) shall be conducted by the supervisor and a faculty member nominated by the HOD. For a total of 20 marks, 80% of best one of the two evaluation and 20% of the other evaluation are added and finalized.

External Semester Evaluation (30 Marks): A report on socially relevant project shall be submitted by group of students to the department at the end of the semester. The Viva-Voce examination shall be conducted by the committee consisting of internal examiner (supervisor) and external examiner appointed by the University. The Viva-Voce examination shall be planned along end semester practical examinations.

Mandatory Course (M.C):

There shall be Mandatory Course with zero credits. There shall be no external examination. However, a minimum of 75% attendance is mandatory in that particular subject.

Engineering Exploration Course:

For Engineering Exploration Project there shall be continuous evaluation during the semester for 20 internal marks and 30 external marks. Internal Evaluation (20 Marks): Two internal evaluations in the form of presentations (First one before I Mid-term and Second one before the II-Mid-term examinations) shall be conducted by the supervisor and a faculty member nominated by the HOD. For a total of 20 marks, 80% of best one of the two evaluation and 20% of the other evaluation are added and finalized. External Semester Evaluation (30 Marks): A report on engineering exploration project shall be submitted by group of students to the department at the end of the semester. The Viva-Voice examination shall be conducted by the committee consisting of internal examiner (supervisor) and external examiner appointed by the University. The Viva-Voce examination shall be planned along end semester practical examinations.

Procedure for Conduct and Evaluation of MOOC:

There shall be a Discipline Centric Elective Course through Massive Open Online Course (MOOC) as Program Elective course. The student shall register for the course (Minimum of 12 weeks) offered by SWAYAM/NPTEL/JNTUK MOOCS through online with the approval of Head of the Department. The Head of the Department shall appoint one mentor for each of the MOOC subjects offered. The student needs to register the course in the SWAYAM/NPTEL portal in the previous semester. During the course, the mentor monitors the student's assignment submission given by SWAYAM/NPTEL at the end of every week. The student needs to submit all the assignments given and needs to take final exam at the proctor center. The student needs to earn a certificate by passing the exam. The student will be awarded the credits given in curriculum only by submission of the certificate.

Mini Project/Internship/Industrial Training/Skill Development programmes/Research Project guidelines:

It shall be evaluated for 50 external marks at the end of the semester. The committee consists of an external examiner appointed by the University; Head of the Department, supervisor of the Mini Project/Internship/Industrial Training/Skill Development programmes/Research Project and a senior faculty member of the department. There shall be no internal marks for Industrial Oriented Mini Project/Summer Internship.

Project

Project Work I:

The total marks for Project Work I is 50 marks and distribution shall be 20 marks for internal and 30 marks for external evaluation. The supervisor assesses the student for 10 marks (Continuous Assessment: 5 marks, Report –5 marks). At the end of the semester, projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consists of supervisor, a senior faculty and HOD for 10 marks. The external evaluation of Project Work I is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner appointed by the University and is evaluated for 30 marks.

Project Work II:

The total marks for project work II is 150 marks and distribution shall be 60 marks for internal and 90 marks for external evaluation. The supervisor assesses the student for 30 marks (Continuous Assessment: 15 marks, Report –15 marks). At the end of the semester, projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work II is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner appointed by the University and is evaluated for 90 marks.

CO Assessment Process for Project Part I

Review #	Coverage Points	Marks	Weightage
1	Project Proposal Evaluation	10	40%
2	Mid – Term Evaluation	5	
3	Final Evaluation	5	
External Project Part I Evaluation		30	60%
Total		50	100%

Rubrics for Project Part I Internal Evaluation

Review #	Parameter	Rubric			Marks
		Poor	Average	Good	
1	Objectives, Project Synopsis, Literature Survey	Need Improvement	Clear and Moderate	Well defined and good	10
		0 – 5 Marks	6 – 8 Marks	9 – 10 Marks	
2	Proposed Methodology & Project execution progress	Need Improvement	Clear and Satisfactory	Well defined and good	5
		0 – 1 Marks	2 – 3 Marks	4 – 5 Marks	
3	Result, Conclusion and Presentation	Inappropriate	Average	Effective	5
		0 – 1 Marks	2 – 3 Marks	4 – 5 Marks	

CO Assessment Process for Project Part II

Review #	Coverage Points	Marks	Weightage
1	Project Proposal Evaluation	20	40%
2	Mid – Term Evaluation	20	
3	Final Evaluation	20	
External Project Part I Evaluation		90	60%
Total		150	100%

Rubrics for Project Part II Internal Evaluation

Review #	Parameter	Rubric			Marks
		Poor	Average	Good	
1	Objectives, Project	Need Improvement	Clear and Moderate	Well defined and good	20

	Synopsis, Literature Survey	0 – 7 Marks	8 – 14 Marks	15 – 20 Marks	
2	Proposed Methodology & Project execution progress	Need Improvement	Clear and Satisfactory	Well defined and good	20
		0 – 7 Marks	8 – 14 Marks	15 – 20 Marks	
3	Result, Conclusion and Presentation	Inappropriate	Average	Effective	20
		0 – 7 Marks	8 – 14 Marks	15 – 20 Marks	

Indirect Method

The indirect assessment for course outcome is done by the Semester End Course Feedback taken at the end of each course from the students. For each CO, there will be three options with weightage namely GOOD (3), AVERAGE (2) AND POOR (1), out of which the student has to select one option.

Sl. No.	Method	Frequency
1	Course End Feedback	Per course at the end of each semester

CO ATTAINMENT PROCESS

Course Outcomes (CO) Direct Attainment Level

S. No.	Threshold level (%)	Attainment level Criteria	Attainment level
1	Class Average	More than 80% of students scoring more than class average	3
		56 to 79% of students scoring more than class average	2
		At least 55% of students scoring more than class average	1

University Result grading system

Marks Range Theory (Max – 100)	Marks Range Lab (Max – 75)	Letter Grade	Level	Grade Point
≥ 90	≥ 67	O	Outstanding	10
≥80 to <90	≥60 to <67	S	Excellent	9
≥70 to <80	≥52 to <60	A	Very Good	8
≥60 to <70	≥45 to <52	B	Good	7
≥50 to <60	≥37 to <45	C	Fair	6
≥40 to <50	≥30 to <37	D	Satisfactory	5
<40	<30	F	Fail	0
			Absent	0

Course Outcome Attainment**Computation of CO Direct Attainment in the course**

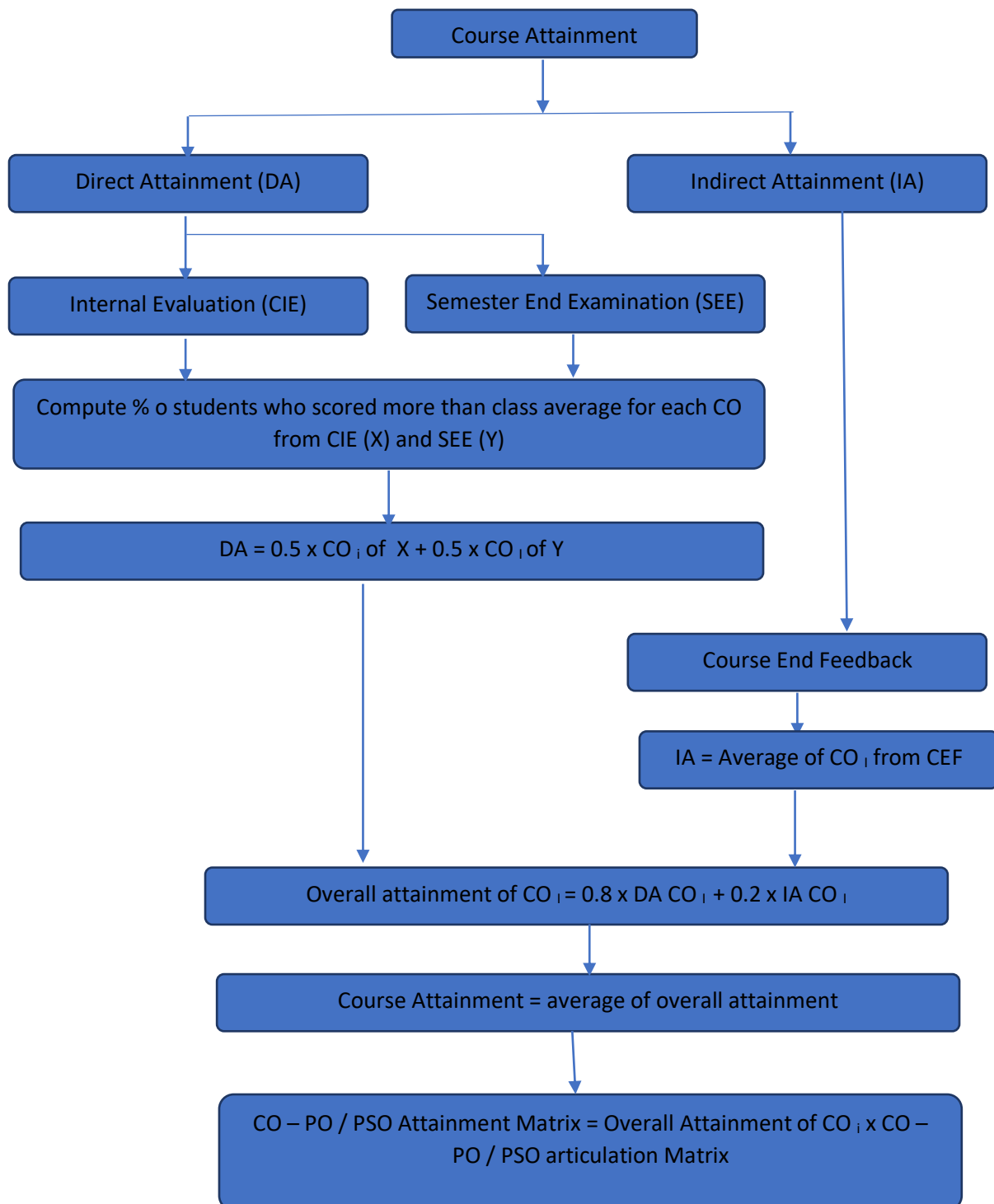
Direct CO Attainment = 65% of CIE Attainment Level + 35% of SEE Attainment Level

Computation of CO Indirect Attainment in the course

Indirect Attainment Average value of each CO

OVERALL CO Attainment in the course:

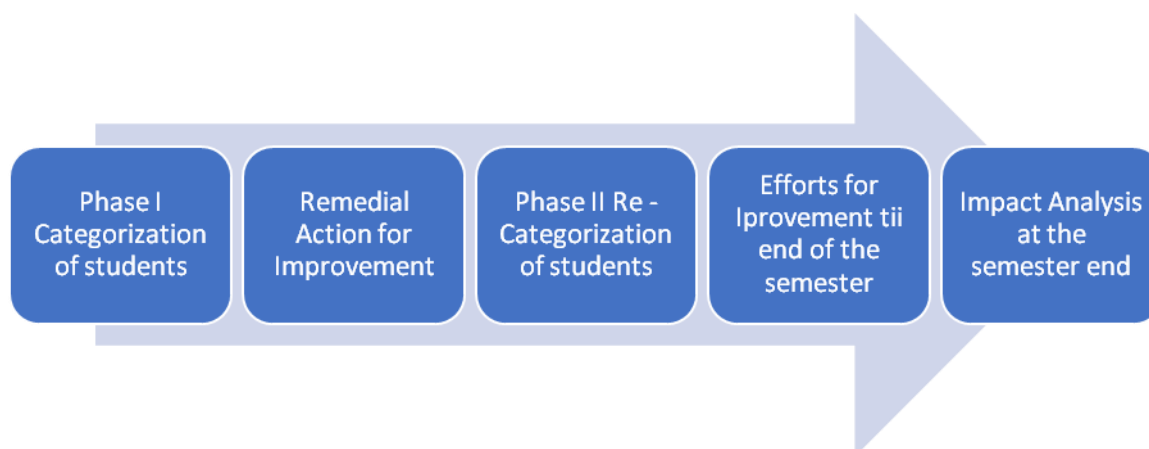
Computation of Attainment of COs in the course = 80% of Direct CO Attainment+ 20% of Indirect CO Attainment



S.No	ROLL NO	Internal Examination-1											Internal Examination-2											Internal	End Semester grade	Grade Point
		1(A)	1(B)	2(A)	2(B)	3(A)	3(B)	Total	Assign.	Quiz	Total	1(A)	1(B)	2(A)	2(B)	3(A)	3(B)	Total	Assign.	Quiz	Total					
Maximum Marks		4	0	4	0	2	0	10	5	10	25	2	0	4	0	4	0	10	5	10	25	25	O	10		
																						Internal	Univ. Exam	CO Attainment from Assessment	CO Attainment from Feedback	Overall CO Attainment
C314.1		3						3	1													2.33	3.00	2.67	2.00	2.53
C314.2			3					3	1													2.33	3.00	2.67	2.00	2.53
C314.3				3				3	1	3							3	1				2.33	3.00	2.67	3.00	2.73
C314.4											3	3										2.33	3.00	2.67	2.00	2.53
C314.5													3				3	1				2.33	3.00	2.67	3.00	2.73
																						Overall Course attainment			2.61	
																						Set target for course attainment			2	
																						Status of the course attainment (Yes/No)			Yes	
Course Outcomes																										
C314.1	Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem (Understand)																									
C314.2	Apply the language/framework of different AI methods for a given problem. (Apply)																									
C314.3	Implement basic AI algorithms- standard search algorithms or dynamic programming (Apply)																									
C314.4	Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports (Create)																									
C314.5	Implement various knowledge representation techniques for acquisition and validate various structures in expert's system domain. (Apply)																									
Base Target taken for CO:		2		Class average Mark		5.00																				
Rubrics:																										
>80% students		3																								
80 to 55% students		2		Best performing Course Outcome:		C314.3																				
<55 % students		1		Least performing Course Outcome:		C314.1																				

STUDENT COMPETENCY

Chart of Action Plan



Guidelines for First Year

Phase I- Categorization (After 20 Days of start of semester)	Phase II- Re-categorization (After Mid Term Result)
12th Marks	MID Term I Result
Attendance & Behavior	Timely Completion of Assignment
	Attendance & Behavior
	Previous Semester University Result (Applicable for Sem-II)

Guidelines for Higher Classes

Phase I- Categorization (After 15 Days of start of semester)	Phase II- Re-categorization (After Mid Term Result)
Previous semester University Result whichever is available	Mid Term Result
Attendance & Behavior	Timely completion of Assignment work
	Attendance & Behavior
	Previous semester University Result

Base Score for student category

Less than **threshold value*** -Slow Learner

Greater than **threshold value***-Advanced Learner

*Threshold Value – decided by course coordinator

Strategies for Slow and Advanced Learners

For Slow learners

- Document/record of remedial classes with timetable & attendance
- Specially designed assignment/ task
- Student study group for peer to peer learning
- Individual Counseling

Note: Remedial sessions should be conducted once every week.

For Advanced Learners

- Encouraging to present & publish papers in journals/conferences/competitions
- Guidance for GATE/ competitive Examination
- Encouraging to participate in professional activities.
- Specially designed activities to improve the portfolio of students.
- Individual guidance for career building

Note: Activities should be on continuous basis.

Activity Based Learning



Examples:

MOOC, Flipped Classroom, Think Pair Share, Think Pair Solo, Four Corners, Round Robin, Collaborative Learning, Jig-Saw Puzzle, Matrix Method, Peer Learning, Work-Based

Learning, Problem-Based Learning, Personalized Learning, Group Discussion, Debate, Case Studies, Fish Bowl, Reciprocal Teaching, etc.

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:

- **Student Exit Feedback** is collected from the students of that batch immediately after their graduation.
- **Employer Feedback** 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.

List of Assessment Tools and Processes

Attainment of POs & PSOs is based on direct assessment tools as well as indirect assessment tools. Direct Assessment of POs & PSOs is based on the student's performance in both internal examinations and University Examinations for all courses.

Performance of the students in different assessments such as internal examinations and University examinations lead to attainment of COs and they in turn leads to attainment of POs & PSOs based on the mappings of CO-PO/PSO.

To evaluate the attainment of POs/PSOs the following tools are used.

- Direct Assessment Tools
- Internal Examinations
 - Theory Courses
 - Lab Courses
 - Seminar
 - Project
- University Examinations
 - Theory Courses
 - Lab Courses
 - Project
- Indirect Assessment Tools
 - Student Exit Feedback
 - Alumni Feedback
 - Employer Feedback

Quality and Relevance of Assessment Tools and Processes

The Programme Assessment and Quality Improvement Committee (PAQIC) decided to have the following PO Assessment methods for various POs, depending on the number of courses contributing to each PO.

PO Attainment having more than 50% courses contributed to PO / PSO

1	Assessment of COs & their contribution to PO Attainment	80 %
2	Indirect Assessment (Students Exit Feedback, Alumni Feedback, Employer Feedback)	20 %

PO Attainment having less than 50% courses contributed to PO / PSO

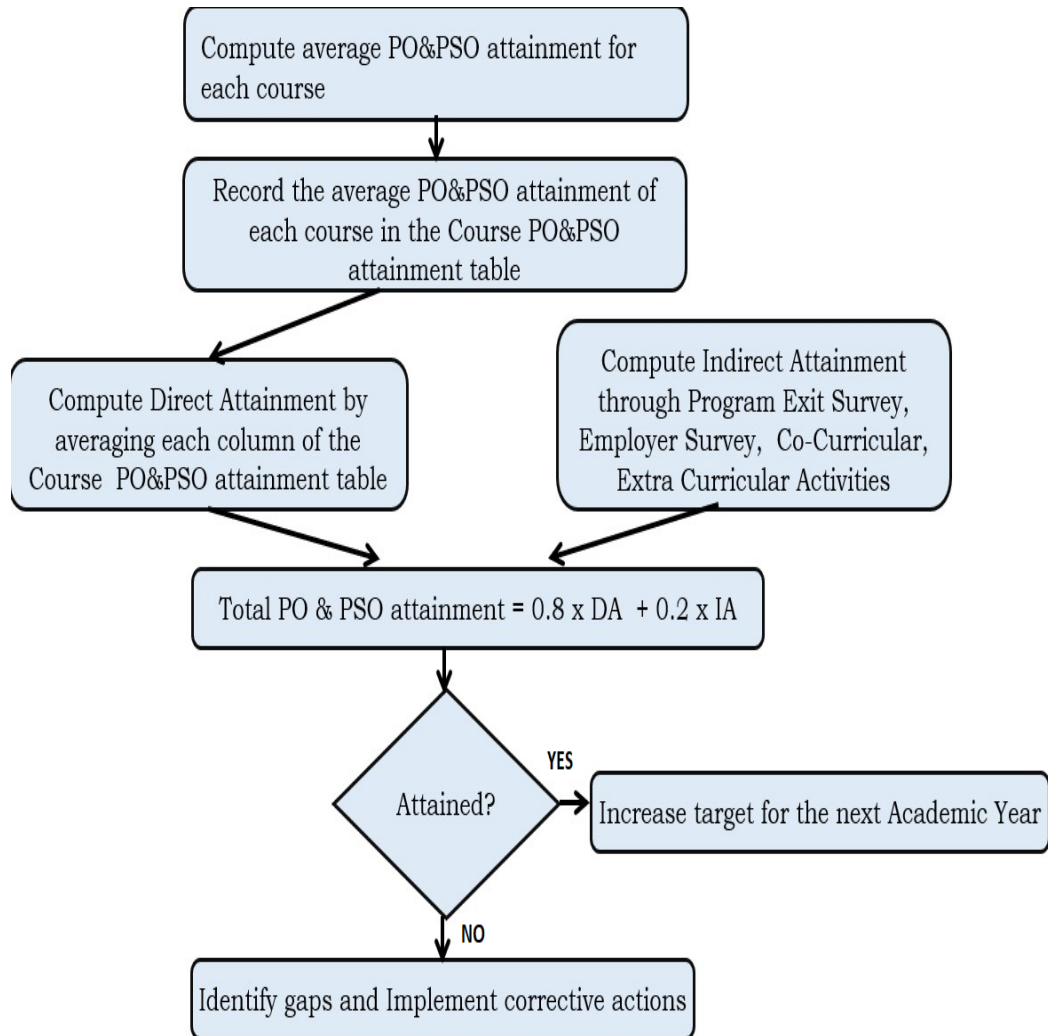
1	Assessment of COs & their contribution to PO Attainment	60%
2	Students Exit Feedback	20 %
3	Alumni Feedback	
4	Employer Feedback	

5	Assessment of student participation in Co/Extra-curricular Activities & contribution to PO Attainment	20%
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Rubrics for student participation in Co / Extra-Curricular activities for attainment of PO / PSO

S.No	Activity	Poor (1)	Satisfactory (2)	Good (3)	Activities conducted	Assessment
1	Guest Lectures (Co-Curricular)	1-2 Guest Lectures organized	3-4 Guest Lectures organized	>= 5 Guest Lectures organized	5	3
2	Add-on courses (Co-Curricular)	1 Add-on course organized	2 Add-on courses organized	3 Add-on courses organized	3	2
3	Project Exhibition (Co-Curricular)	Nil	Every Year	Every Semester	Every Year	2
4	Paper Presentation (Co-Curricular)	Nil	Every Year	Every Semester	Every Year	2
5	NSS Activities (Extra Curricular)	Less than 25% students participation	26-50% students participation	Above 50% students participation	30%	2
6	Programs on Environment and sustainability (Co-Curricular)	Nil	1-2 programs organized	More than 2 programs organized	2	2
7	Programs on Ethics (Co-Curricular)	Nil	1-2 programs organized	More than 2 programs organized	2	2
8	Programs on Ethics like Yoga (Extra Curricular)	Nil	1-2 programs organized	More than 2 programs organized	2	2

9	Programs on Project Management	Nil	1-2 programs organized	More than 2 programs organized	2	2
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PROCEDURE FOR THE ATTAINMENT OF PROGRAM OUTCOMES (POs) AND PROGRAM SPECIFIC OUTCOMES (PSOs)

CONTINUOUS IMPROVEMENT

Contribution of CO in PO attainment and Continuous Improvement (Faculty Level)

Outcome	Action to be taken by faculty
High attainment of all CO-PO (>2.5 out of 3)	Set new higher targets or attainment levels for next Academic Year (AY)
Moderate attainment of all CO-PO (1.8 to 2.49 out of 3)	Record observations, Continue action plan of last A.Y. with plan for improvements.
Low attainment of all CO- PO(0.9 to 1.79 out of 3)	Record observations, assess the target set, revise/improve action plan of last A.Y. to achieve the attainment with plan for improvements.
CO-PO not attained, poor performance (<0.9 out of 3)	Record observations, Critical assessment of target with Program Assessment and Quality Improvement Committee (PAQIC), Revise action plan of last A.Y. at faculty/department level.

PO attainment and Continuous Improvement (PC and HoD Level)

Category	Outcome	Action by PC and HoD
Course Related	PO attained highly	Include activities with HOT.
	PO not attained highly	Identify concerned courses, plan for immediate improvements, guide, support and monitor its execution.
Activity Related	Activities Conducted	Critical assessment, impact analysis to be done and revise as per the need for improvements.