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# ASSESSMENT MANUAL

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R16 REGULATION



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

**2017**

## 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

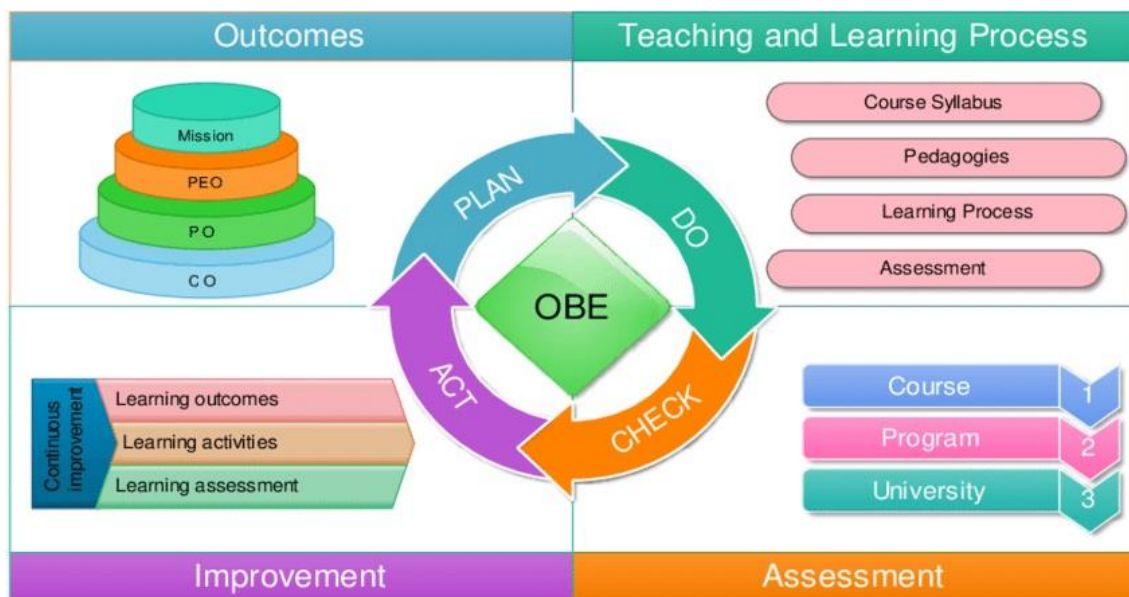
- **Clarity:** The focus on outcome creates a clear expectation of what needs to be accomplished by the end of the course.
- **Flexibility:** With a clear sense of what needs to be accomplished, instructors will be able to structure their lessons around the students' needs.
- **Comparison:** OBE can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

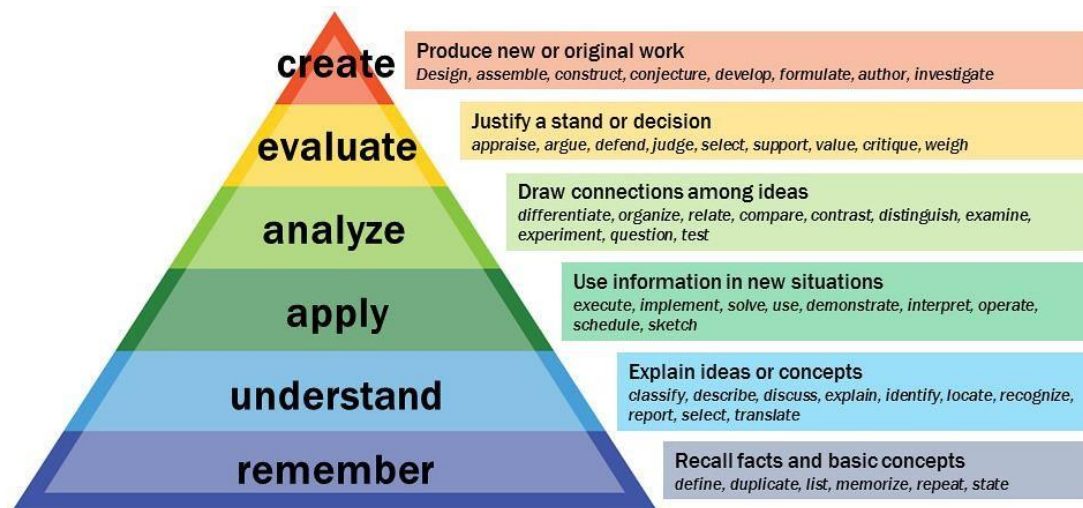


Fig.1: Revised Bloom's Taxonomy of Critical Thinking

#### 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:<br>REMEMBER   | L2:<br>UNDERSTAND   | L3:<br>APPLY  | L4:<br>ANALYSE   | L5:<br>EVALUATE   | L6:<br>CREATE  |
| <ul style="list-style-type: none"> <li>• Recognizing (identifying)</li> <li>• Recalling (retrieving)</li> </ul> | <ul style="list-style-type: none"> <li>• Interpreting</li> <li>• Exemplifying</li> <li>• Classifying</li> <li>• Summarizing</li> <li>• Inferring (concluding)</li> <li>• Comparing</li> <li>• Explaining</li> </ul> | <ul style="list-style-type: none"> <li>• Executing</li> <li>• Implementing</li> </ul> | <ul style="list-style-type: none"> <li>• Differentiating</li> <li>• Organizing</li> <li>• Attributing</li> </ul> | <ul style="list-style-type: none"> <li>• Checking (coordinating, detecting, testing, monitoring)</li> <li>• Critiquing (judging)</li> </ul> | <ul style="list-style-type: none"> <li>• Planning</li> <li>• Generating</li> <li>• Producing (constructing)</li> </ul> |

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

| The Knowledge Dimension  |   |  |  |
|--|---|--|--|
| Categories specific to Engineering   |   |  |  |
| FUNDAMENTAL DESIGN CONCEPTS  | CRITERIA AND SPECIFICATIONS   | PRACTICAL CONSTRAINTS  | DESIGN INSTRUMENTALITIES   |
| <ul style="list-style-type: none"> <li>Operational principles of devices and components within a device or system</li> </ul> | <ul style="list-style-type: none"> <li>Knowledge of translating the qualitative goals for the device into specific, quantitative goals</li> </ul> | <ul style="list-style-type: none"> <li>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.</li> </ul> | <ul style="list-style-type: none"> <li>Procedural knowledge including the procedures, way of thinking, and judgmental skills by which it is done.</li> </ul> |

### 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            |
|-----------------|-------------------|--------------|----------------|-----------------|---------------|
| <b>REMEMBER</b> | <b>UNDERSTAND</b> | <b>APPLY</b> | <b>ANALYZE</b> | <b>EVALUATE</b> | <b>CREATE</b> |
| 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       |           | Set up      |
|           |                |            | 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.

|                   |  |
|-------------------|--|
| <b>Specific</b>   | Is there a description of precise behavior and the situation it will be performed in? Is it concrete, detailed, focused and defined? |
| <b>Measurable</b> | Can the performance of the outcome be observed and measured?   |
| <b>Achievable</b> | With a reasonable amount of efforts and application can the outcome be achieved? Are you attempting too much?                        |
| <b>Relevant</b>   | Is the outcome important or worthwhile to the learner or stakeholder? Is it possible to achieve this outcome?                        |
| <b>Time-Bound</b> | 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<br>(including Lecture, Tutorial & Practical) |
|----------------|--|
| No mapping (-) | < 5%   |
| Low (1)        | 5- 15%   |
| Medium (2)     | 15- 25%  |
| High (3)       | >25%   |

#### Description:

Number of Lectures = 3 per 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 =  $(15/96) \times 100 = 15.65\%$ . Medium mapping (2)

- **Number of Assessment Tools used**

| <b>Level</b>   | <b>Assessment tools used to assess the CO</b> |
|----------------|---|
| 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"> <li>✓ Mid Examinations</li> <li>✓ Assignment</li> </ul>                                 | <ul style="list-style-type: none"> <li>✓ Semester End Examination</li> </ul> | <ul style="list-style-type: none"> <li>✓ Course End Feedback</li> </ul> |
| Lab Course    | <ul style="list-style-type: none"> <li>✓ Day – to – Day work</li> <li>✓ Record</li> <li>✓ Internal Examination</li> </ul>  | <ul style="list-style-type: none"> <li>✓ Semester End Examination</li> </ul> | <ul style="list-style-type: none"> <li>✓ Course End Feedback</li> </ul> |
| Seminar       | <ul style="list-style-type: none"> <li>✓ Synopsis</li> <li>✓ Mid Term Evaluation</li> <li>✓ Internal Evaluation</li> </ul> | NA   | NA  |
| Project       | <ul style="list-style-type: none"> <li>✓ Synopsis</li> <li>✓ Mid Term Evaluation</li> <li>✓ Internal Evaluation</li> </ul> | <ul style="list-style-type: none"> <li>✓ End Evaluation</li> </ul>           | NA  |

### The Quality / Relevance of assessment processes & tools used

#### Theory Courses Evaluation

For theory subjects, during the semester there shall be two internal examinations. The weightage of Internal examination marks for 30 consists of Descriptive – 15, Assignment - 05 (Theory, Design, Analysis, Simulation, Algorithms, Drawing, etc. as the case may be and for Physics, Virtual Labs are to be considered as Assignments) Objective -10 (Conducted with 20 Multiple choice question with a weightage of ½ Mark each). The objective examination is for 20 minutes duration. The subjective examination is for 90 minutes duration conducted for 15 marks. Each subjective type examination question paper shall contain 3 questions and all questions need to be answered. The Objective examination conducted for 10 marks and subjective examination conducted for 15marks are to be added to the assignment marks of 5 for finalizing internal marks for 30.

Internal examination Marks can be calculated with 80% weightage for best of the two Mid Examinations and 20% weightage for other Mid Examination. As the syllabus is framed for 6 units, the 1st mid examination (both Objective and Subjective) is conducted in 1-3 units and second test in 4-6 units of each subject in a semester.

The end semester examination is conducted covering the topics of all Units for 70 marks. End Exam Paper: Part-A 1st Question is mandatory covering all the syllabus which contains seven 2 marks questions for 14 marks with at least 2 marks of question for each of the six units and in Part-B 4 Questions out of 6 Questions are to be answered with each carrying 14 marks. Part-A & Part-B put together gives for 70marks.

### Direct Method:

| Evaluation      | Exam Mode   | Max. Marks | Frequency          | Duration |
|-----------------|---|------------|--------------------|----------|
| <b>Internal</b> | MID (Descriptive)   | 15         | 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 |            |                    |          |
| <b>External</b> | Part A  | 14         | Once per Semester  | 180 min. |
|                 | Part B  | 56         |                    |          |

### Quality of the Assessment Tool

- Due weightage is given to all the CO's covered by the portion meant for each internal exam.
- 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 25 internal marks and 50 end examination marks. The internal 25 marks shall be awarded as follows: day to day work - 10 marks, Record – 5 marks and the remaining 10 marks to be awarded by conducting an internal laboratory examination. The end examination shall be conducted by the course teacher concerned and external examiner.



**Direct Method:**

| Evaluation | Exam Mode           | Max. Marks | Frequency           | Duration |
|------------|---------------------|------------|---------------------|----------|
| Internal   | Day – to – Day work | 10         | Once per Experiment | 150 min. |
|            | Laboratory Record   | 5          | Once per Experiment |          |
|            | Internal Exam       | 10         | Once per Semester   | 180 min. |
| External   | End Exam            | 50         | Once per Semester   | 180 min. |

**Rubrics used for laboratory Course**

| Parameters                             | Marks | Poor   | Average  | Good   |
|--|-------|--|--|--|
| Students' observation book preparation | 5     | Insufficient                                       | Fair   | Good   |
|  |       | 0 – 2 Marks  | 3 – 4 Marks  | 5 Marks  |
| Attendance                             | 5     | 75 % - 80 %  | 80 % - 90 %  | 90 % - 100 %   |
|  |       | 0 – 2 Marks  | 3 – 4 Marks  | 5 Marks  |
| Record                                 | 5     | Insufficient recording calculations and conclusion | Fair recording of content, calculations and conclusion | Good recording of content, calculations and conclusion |
|  |       | 0 – 2 Marks  | 3 – 4 Marks  | 5 Marks  |

**Rubrics used for Laboratory Internal Examination**

| Parameters         | Marks | Poor  | Average   | Good                                      |
|--------------------|-------|---|---|---|
| Experiment writeup | 3     | Not able to write procedure and calculations. | Able to write procedure but not able to show the results. | Able to write procedure and show results. |
|                    |       | 0 – 1 Marks                                   | 1 – 2 Marks   | 3 Marks                                   |
| Execution          | 4     | Not executed                                  | Partially executed  | Completely executed                       |
|                    |       | 0 – 1 Marks                                   | 2 – 3 Marks   | 4 – 5 Marks                               |
| Viva – Voce        | 3     | Insufficient Knowledge of experiment          | Fair knowledge of experiment                              | Good knowledge of experiment              |

|  |  |            |             |         |
|--|--|------------|-------------|---------|
|  |  | 0 – 1 Mark | 1 – 2 Marks | 3 Marks |
|--|--|------------|-------------|---------|

### CO Assessment Process for Engineering Drawing

#### Direct Method:

| Evaluation | Method   | Max. Marks | Frequency          | Duration   |
|------------|--|------------|--------------------|------------|
| Internal   | Day-to-Daywork   | 20         |                    |            |
|            | Internal Test  | 10         | Twice per semester | 90 Minutes |
|            | Internal assessment (30 marks) = 80% of Best Mid + 20% The other Mid |            |                    |            |
| External   | Exam   | 70         | Once per semester  | 3 Hours    |

#### Mandatory Course (MC)

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

#### Seminar

For the seminar, each student has to be evaluated based on the presentation of any latest topic with report of 10-15 pages and a ppt of min 10 slides. The student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

#### CO Assessment Process for Seminar

| Evaluation | Method            | Marks | Weightage         | Duration            |
|------------|-------------------|-------|-------------------|---------------------|
| Internal   | Mid-term review 1 | 15    | 30% of max. marks | 15 min. per student |
|            | Mid-term review 2 | 15    | 30% of max. marks |                     |
|            | Final review      | 20    | 40% of max. marks |                     |

#### Rubrics for seminar Internal Evaluation

| Parameter | Rubric |         |      | Marks |
|-----------|--------|---------|------|-------|
|           | Poor   | Average | Good |       |
|           |        |         |      |       |

|                  |                            |   |   |    |
|------------------|----------------------------|---|---|----|
| Seminar report   | Objectives not clear       | Clear objectives and organized          | Clear objectives, advanced technology based and organized       | 20 |
|                  | 1 – 6 Marks                | 7 – 14 Marks                            | 15 – 20 Marks   |    |
| Preparation      | Contents are inappropriate | Appropriate contents, not well arranged | Appropriate contents and well arranged                          | 20 |
|                  | 1 – 6 Marks                | 7 – 14 Marks                            | 15 – 20 Marks   |    |
| Queries answered | No answer or explanation   | Inappropriate answer and explanation    | Clear, concise answer with explanation and with supported facts | 10 |
|                  | 1 – 3 Marks                | 4 – 6 Marks                             | 7 – 10 Marks  |    |

### Project

Out of a total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination. The End Semester Examination (Viva – Voce) shall be conducted by the committee. The committee consists of an external examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be conducted at the end of the IV year. The Internal Evaluation shall be based on two seminars given by each student on the topic of his/her project and evaluated by an internal committee.

### CO Assessment Process for Project

| Review #                    | Coverage Points             | Marks | Weightage |
|-----------------------------|-----------------------------|-------|-----------|
| 1                           | Project Proposal Evaluation | 20    | 30%       |
| 2                           | Mid – Term Evaluation       | 20    |           |
| 3                           | Final Evaluation            | 20    |           |
| External Project Evaluation |                             | 140   | 70%       |
| Total                       |                             | 200   | 100%      |

### Rubrics for Project Internal Evaluation

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

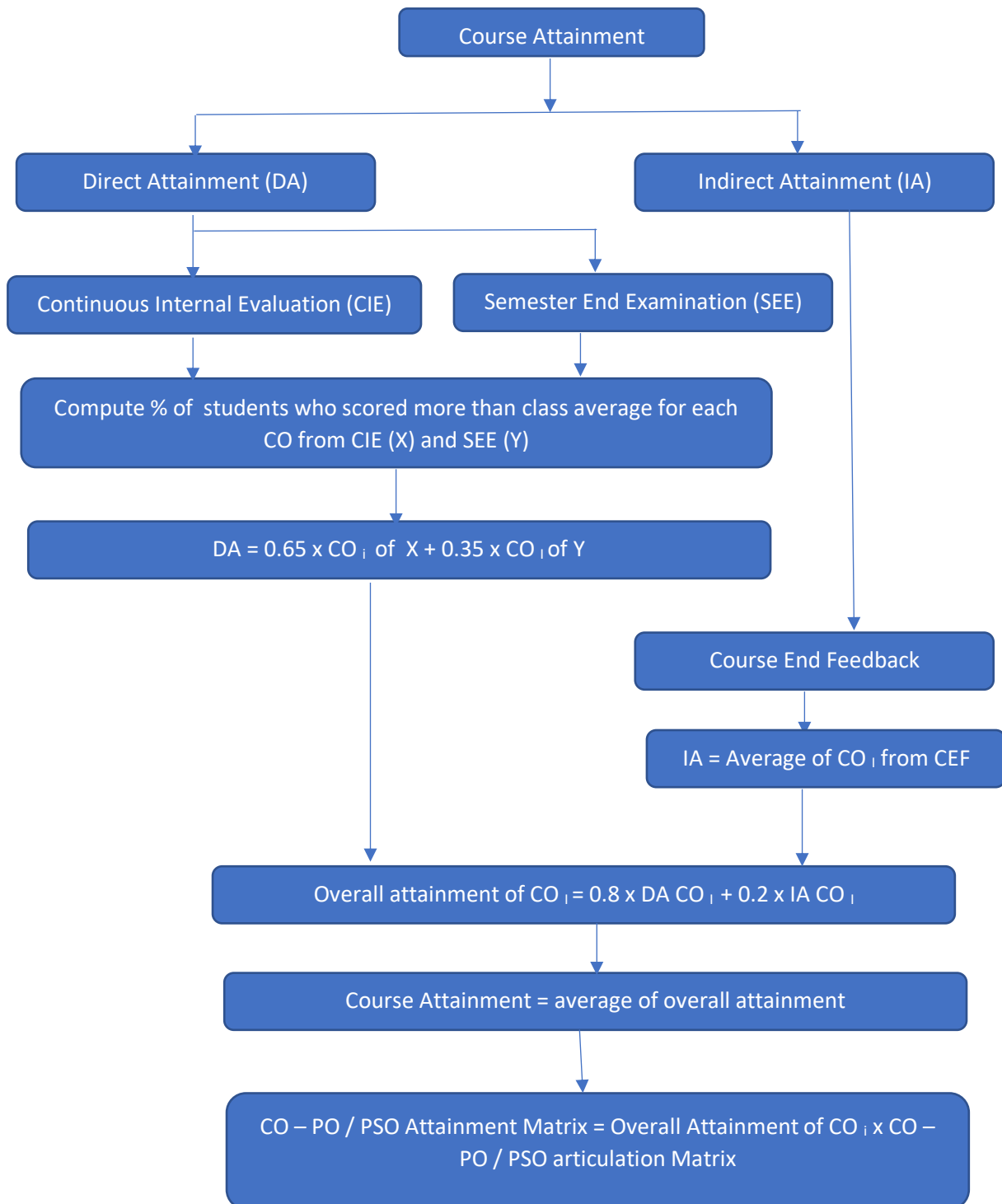
Direct CO Attainment = 65% of CIE Attainment Level + 35% of SEE Attainment Level

#### Computation of CO Indirect Attainment in the course

Indirect Attainment Average value of each CO

#### OVERALL CO Attainment in the course:

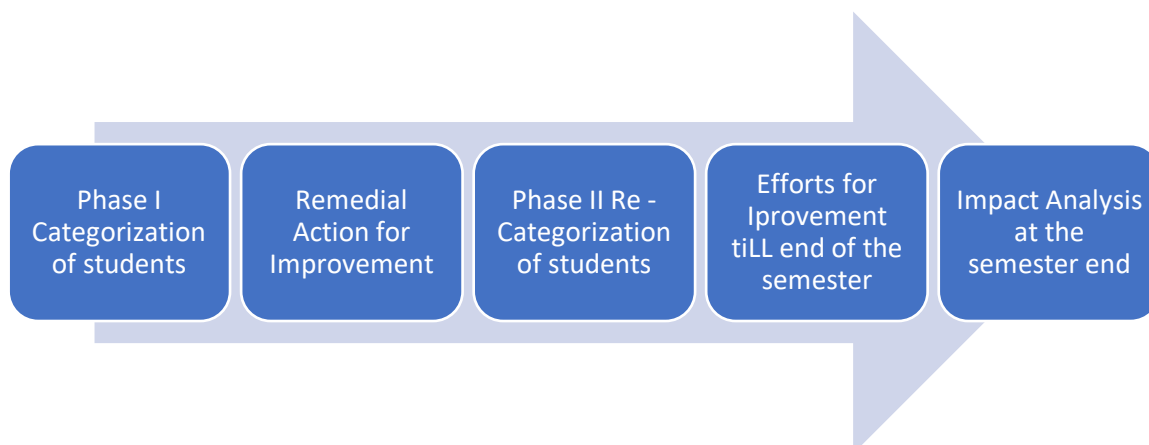
Computation of Attainment of COs in the course = 80% of Direct CO Attainment + 20% of Indirect CO Attainment





## STUDENT COMPETENCY

### Chart of Action Plan



### Guidelines for First Year

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

### Guidelines for Higher Classes

| Phase I- Categorization<br>(After 15 Days of start of semester) | Phase II- Re-categorization<br>(After Mid Examination Result) |
|---|---|
| Previous semester University Result whichever is available      | Mid Examination 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**

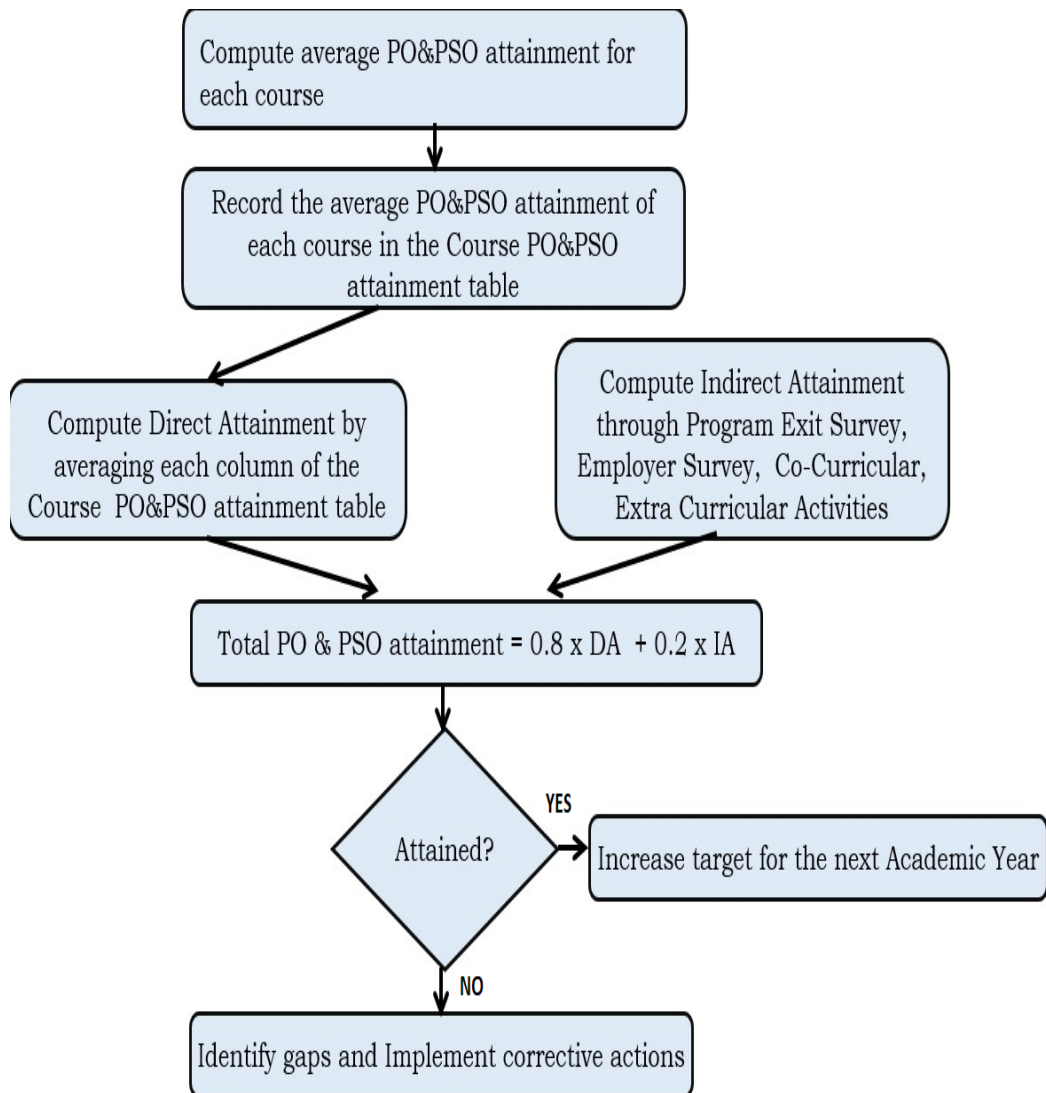
|   |  |      |
|---|--|------|
| 1 | Assessment of COs & their contribution to PO Attainment                          | 80 % |
| 2 | Indirect Assessment (Students Exit Feedback, Alumni Feedback, Employer Feedback) | 20 % |

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

|   |   |      |
|---|---|------|
| 1 | Assessment of COs & their contribution to PO Attainment   | 60%  |
| 3 | Students Exit Feedback  | 20 % |
| 2 | Alumni Feedback   |      |
| 3 | Employer Feedback   |      |
| 4 | Assessment of student participation in Co/Extra-curricular Activities & contribution to PO Attainment | 20%  |

**Rubrics for student participation in Co / Extra-Curricular activities for attainment of PO / PSO**

| S. No | Activity                                      | Low (1)                              | Medium (2)                    | High (3)                            | Assessment |
|-------|---|--------------------------------------|-------------------------------|-------------------------------------|------------|
| 1.    | Guest Lectures (Co-Curricular)                | 1 Guest Lectures organized           | 2 Guest Lectures organized    | >= 3 Guest Lectures organized       | 3          |
| 2.    | Add-on courses (Co-Curricular)                | Nil                                  | 1-2 programs organized        | More than 2 programs organized      | 2          |
| 3.    | NSS Activities (Extra- Curricular)            | Less than 25%student's participation | 26-50%student's participation | Above 50% student's participation   | 3          |
| 4.    | Programs on Entrepreneurship                  | Nil                                  | 1-2 programs organized        | More than 2 programs organized      | 2          |
| 5.    | Job/Skill Oriented Programs                   | 1-4 Programs                         | 5-8 Programs                  | More Than 8 Programs                | 3          |
| 6.    | Students participation in cultural activities | 10-25% students participate          | 26-50% students participated  | More than 50% students participated | 1          |
| 7.    | Students internships                          | Less than 1% students                | 1-10% students                | More than 10%                       | 3          |
| 8.    | Workshop Conducted for Students               | 1-2 Workshop Conducted               | 3 -5 Workshop Conducted       | More than 5 Workshop Conducted      | 1          |



**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 PAQIC 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.           |