



## Standard Operating Procedure (SOP) for Attainment of Course Outcomes (COs), Program Outcomes (POs) and Program Specific Outcomes (PSOs)

### 1. Purpose

To define a systematic, transparent and measurable process for assessing, evaluating and attaining **Course Outcomes (COs), Program Outcomes (POs), and Program Specific Outcomes (PSOs)** in line with **Outcome-Based Education (OBE)** requirements prescribed by **VTU, NBA, and NAAC**, and to ensure continuous improvement in teaching–learning processes.

### 2. Scope

This SOP is applicable to:

- All **UG programs** offered by the institution
- All **theory, laboratory, seminar, project, internship, and co-curricular activities**
- All **faculty members, students, course coordinators, project coordinators, HODs, and IQAC**

### 3. References

- VTU Curriculum & Examination Ordinances
- NBA SAR Guidelines
- NAAC Accreditation Manual
- Institute Vision, Mission, PEOs, POs and PSOs
- IQAC Academic Manual

### 4. Definitions

- **CO (Course Outcome):** Measurable statements describing what a student will be able to do at the end of a course.
- **PO (Program Outcome):** Graduate attributes describing knowledge, skills and attitudes expected at the end of the program.
- **PSO (Program Specific Outcome):** Discipline-specific skills expected from graduates of a program.
- **Direct Assessment:** Assessment through examinations, tests, labs, projects, etc.



- **Indirect Assessment:** Assessment through surveys and feedback from stakeholders.

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## 5. Responsibility

- **IQAC:** Overall monitoring, standardization, audit, and approval of attainment methodology
- **Head of Department (HOD):** Implementation, review, and corrective actions
- **Course Coordinators:** CO definition, mapping, assessment, and analysis
- **Faculty Members:** Conduct assessments, CO mapping, data compilation
- **Project Coordinators:** Project-based CO–PO–PSO attainment
- **Students:** Participation in assessments and surveys

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## 6. Procedure

### 6.1 Identification and Mapping of Outcomes

1. Course Outcomes (COs) are prescribed by the affiliating university for each course in curriculum.
  - Program Educational Objectives (PEOs)
  - Program Outcomes (POs)
  - Program Specific Outcomes (PSOs)
2. CO–PO–PSO mapping is performed using **correlation levels (1–Low, 2–Medium, 3–High)** as per IQAC guidelines.
3. Mapping is reviewed and approved at:
  - Department level (PAC)
  - Institute level (IQAC)

#### 6.1 Identification and Mapping of Outcomes

1. **Program Outcomes (POs)** are **prescribed by the National Board of Accreditation (NBA)** and are adopted by the institute without modification to ensure compliance with the **NBA Outcome-Based Education (OBE) framework**.
2. **Program Educational Objectives (PEOs)** and **Program Specific Outcomes (PSOs)** are **formulated by the department** through a structured process involving the **Program Assessment Committee (PAC)**, in alignment with:
  - The vision and mission of the department and institute,
  - Stakeholder inputs (industry, alumni, faculty, students),



- The guidelines of the affiliating university.

3. **Course Outcomes (COs)** for each course are **defined in the curriculum prescribed by the affiliating university**. To ensure effective delivery and assessment in line with Outcome-Based Education (OBE) practices.

4. The **COs–POs–PSOs mapping** is carried out by the department using **correlation levels of 1 (Low), 2 (Medium), and 3 (High)**, following **NBA and IQAC guidelines**.

5. The mapping is:

- **Reviewed and validated at the department level** by the **PAC**, and
- **Approved at the institute level** by the **Internal Quality Assurance Cell (IQAC)** to ensure conformity with **NBA, NAAC, and affiliating university requirements**.

## 6.2 Assessment Processes for CO Attainment

### 6.2.1 Direct Assessment Methods

As mandated by VTU, the following direct assessment tools are used:

Sl. No	Assessment Method	Description
1	Internal Assessment Tests	2 IAs for IPCC courses and 3 IAs for PCC courses per semester
2	Laboratory Internal Assessment	Continuous evaluation using rubrics (procedure, results, viva, attendance)
3	Seminar Assessment	Evaluated by committee using defined rubrics
4	Project Internal Assessment	Feasibility & progress seminars evaluated using rubrics
5	University Theory Examination	External evaluation by VTU
6	University Laboratory Examination	External practical & viva
7	Project Viva Voce	External and internal evaluation as per VTU norms



### 6.2.2 Indirect Assessment Methods

Sl. No	Tool	Purpose
1	Course Exit Survey	Measures students perception of COs attainment
2	Program Exit Survey	Measures PO & PSO attainment at graduation
3	Alumni Survey	Long-term relevance and effectiveness
4	Employer Survey	Industry readiness and professional skills
5	Activity-Based Surveys	Technical talks, guest lectures, industrial visits

### 6.3 Setting Target Levels for CO Attainment

1. For **VTU 2021 Scheme**, CO target levels are defined based on course complexity.
2. Attainment levels are set as:

Attainment Percentage	Target Level
35% – 60%	1
61% – 70%	2
71% – 100%	3

3. Target levels are reviewed annually and revised upward if consistently achieved.

### 6.4 Data Collection and Verification

1. Internal Assessment Data
  - o Question-wise CO mapping
  - o Student performance analysis
2. University Examination Results
  - o CO-wise student performance
3. Indirect Survey Data
  - o CO-wise and PO-wise feedback percentages
4. Data is verified by:
  - o Course Coordinator
  - o HOD
  - o IQAC

## 6.5 Calculation of CO Attainment

### 6.5.1 Direct CO Attainment

Calculated using weighted averages:

Direct CO Attainment=(A×0.5)+(B×0.4)+(C×0.1)

Where:

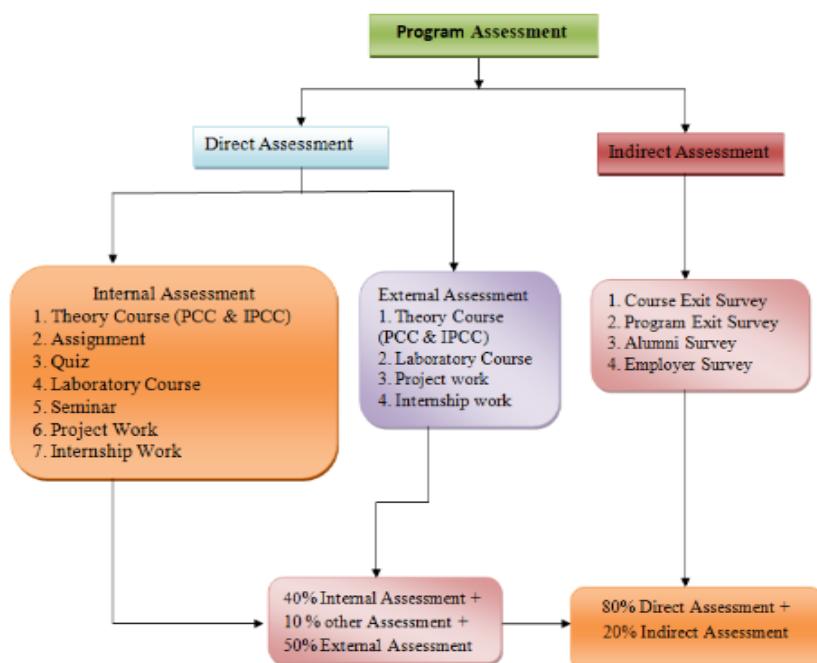
- A = University Exam Attainment Level
- B = Internal Assessment Attainment Level
- C = Other Assessment Attainment Level
- D = Direct Attainment Level
- E = Indirect Attainment Level

### 6.5.2 Indirect CO Attainment

- Derived from Course Exit Survey results
- Converted into attainment levels using target criteria

### 6.5.3 Final CO Attainment

Total CO Attainment=(Direct×0.8)+(Indirect×0.2)





## 6.6 PO and PSO Attainment

1. CO attainment values are mapped to corresponding POs and PSOs using CO–PO–PSO correlation matrix.
2. PO/PSO attainment is calculated as:
  - o Weighted average of contributing CO attainments
3. Indirect assessments (Program Exit, Alumni, Employer surveys) are integrated.

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## 6.7 Review, Analysis and Corrective Actions

1. Attainment results are discussed in:
  - o PAC meetings
2. If attainment is below target:
  - o Tutorial classes
  - o Remedial teaching
  - o Additional assignments
  - o Question paper redesign
  - o Improved pedagogy (active learning, ICT tools)
3. Actions taken are documented and reviewed in the next cycle.

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## 6.8 Documentation and Record Maintenance

- CO–PO–PSO mapping sheets
- Assessment question papers & rubrics
- CO attainment calculations
- Survey analysis reports
- Action taken reports (ATR)

Records are maintained by the department and audited by IQAC during internal academic audits.

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## 7. Outcome

This SOP ensures:

- Transparent and measurable attainment of COs, POs, and PSOs
- Compliance with VTU, NBA, and NAAC requirements



- Continuous improvement in academic quality

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## 10. Approval

This SOP has been reviewed and approved by:

Role	Signature
Department Academic Coordinator (PAC)	
Head of Department	
IQAC	
Dean Academics	
Principal & director	



## 1. Title: SOP for Attainment of Course Outcomes (COs), Program Outcomes (POs), and Program Specific Outcomes (PSOs) – 2018 Scheme

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### 2. Purpose

The purpose of this SOP is to establish a **systematic, transparent, and consistent mechanism** for measuring, analyzing, and improving the attainment of **Course Outcomes (COs), Program Outcomes (POs), and Program Specific Outcomes (PSOs)** for programs offered under the **2018 Scheme** of the affiliating university (VTU).

This SOP ensures:

- Effective implementation of **Outcome Based Education (OBE)**.
- Compliance with **VTU curriculum and assessment regulations**.
- Alignment with **NBA and NAAC accreditation requirements**.
- Continuous improvement through structured feedback and corrective actions.

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### 3. Scope

This SOP is applicable to:

- All UG programs offered under the **2018 Scheme**.
- All theory, laboratory, seminar, project, internship, and practical courses.
- All stakeholders involved in teaching–learning and assessment processes.
- Direct and indirect assessment methods for CO, PO, and PSO attainment.

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### 4. Objectives

- To define a uniform procedure for **CO, PO, and PSO attainment calculation**.
- To ensure **transparent data collection, verification, and analysis**.
- To assess attainment levels using **direct and indirect assessment tools**.
- To identify gaps and implement **continuous improvement actions**.
- To maintain proper documentation for **academic audit and accreditation**.

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## 5. Responsibility

Role	Responsibility
Principal	Overall approval and academic governance
Dean (Academics)	Supervision of OBE implementation
Head of Department (HOD)	Department-level execution and monitoring
Program Assessment Committee (PAC)	Review of attainment results and action plans
Course Coordinators	CO definition, mapping, and attainment calculation
Faculty Members	Assessment, data collection, and documentation
IQAC	Verification, validation, and archival of records

## 6. Identification and Mapping of Outcomes (2018 Scheme)

### 1. Program Outcomes (POs)

- POs are **defined and prescribed by NBA** and adopted by the institution.

### 2. Program Educational Objectives (PEOs) and Program Specific Outcomes (PSOs)

- PEOs and PSOs are **formulated by the department** through:
  - Program Assessment Committee (PAC)
  - Department Advisory Board (DAB)
- Approved by:
  - Department Council
  - IQAC
  - Academic Council

### 3. Course Outcomes (COs)

- COs are **defined in the VTU 2018 Scheme curriculum**.
- Departments may **contextualize COs**, without deviating from the university syllabus, for effective delivery and assessment.

### 4. CO-PO-PSO Mapping

- Mapping is carried out using correlation levels:
  - 1 – Low**
  - 2 – Medium**
  - 3 – High**



- Mapping is reviewed and approved at:
  - Department level (PAC/DAB)
  - Institute level (IQAC)

## 7. Assessment Methods (2018 Scheme)

### 7.1 Direct Assessment Tools

Sl. No.	Assessment Method	Description
1	Internal Assessment Tests (IAs)	Three IA tests conducted per semester for theory courses as per VTU 2018 Scheme
2	Assignments / Quizzes	Course-related assignments and quizzes mapped to COs
3	Laboratory Continuous Evaluation	Based on experiment performance, records, viva voce
4	Seminar Evaluation	Rubric-based evaluation by departmental committee
5	Project Evaluation	Phase-wise evaluation through reviews and viva voce
6	University SEE (Theory)	External evaluation by VTU
7	University SEE (Laboratory/Project)	External practical and project examinations

### 7.2 Indirect Assessment Tools

Sl. No.	Tool	Description
1	Course Exit Survey	Conducted at the end of each course
2	Program Exit Survey	Conducted at the end of the program
3	Alumni Survey	Feedback from graduates
4	Employer Survey	Feedback from recruiters
5	Feedback on IVs / Guest Lectures	Additional inputs for PO/PSO attainment



## 8. CO Attainment Methodology (2018 Scheme)

### 8.1 Target Level Setting

Attainment Percentage	Target Level
1 – 50%	Level 1
51% – 70%	Level 2
71% – 100%	Level 3

- Target levels are reviewed annually.
- If targets are not achieved, corrective actions are planned.

### 8.2 CO Attainment Calculation

#### 1. Direct Attainment Components

- University SEE
- Internal Assessment Tests
- Assignments / Quizzes

#### Weightage for Direct Attainment (2018 Scheme):

- Internal Assessment: **90%**
- Other Assessments: **5%-10%**

## 9. PO and PSO Attainment Methodology

1. CO attainment values are **mapped to corresponding POs and PSOs**.
2. PO/PSO attainment is calculated using:
  - Average of mapped CO attainments (Direct)
  - Program Exit, Alumni, Employer Surveys (Indirect)
3. **Weightage:**
  - Direct PO Attainment:



## 10. Review, Analysis, and Continuous Improvement

- Attainment results are reviewed in:
  - PAC meetings
  - DAB meetings
- Gaps are identified and action plans are proposed, such as:
  - Additional tutorials
  - Remedial classes
  - Improved assessment design
  - Enhanced experiential learning activities
- Action taken reports (ATR) are documented and reviewed in subsequent cycles.

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## 11. Documentation and Records

Each department shall maintain:

- CO–PO–PSO mapping matrices
- Assessment tools and rubrics
- CO, PO, and PSO attainment sheets
- Survey analysis reports
- Minutes of PAC/DAB meetings
- Action Taken Reports (ATR)

Records shall be preserved for **minimum 3 academic years**.

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## 12. Review and Revision

- This SOP is reviewed annually by IQAC.
- Revisions are carried out based on:
  - VTU regulation updates
  - NBA/NAAC guidelines
  - Stakeholder feedback



## 13. Approval

Role	Signature	Date
Course Coordinator		
Program Coordinator		
Head of Department		
Dean (Academics)		
Principal		

If you want, I can next:

- Prepare **flowcharts** for CO/PO/PSO attainment (NBA-ready)
- Convert this into **NAAC Criterion 3 / NBA SAR language**
- Customize it **specifically for Mechanical Engineering (AITM)**



## \*\*Standard Operating Procedure (SOP)

for Attainment of Course Outcomes (COs), Program Outcomes (POs) and Program Specific Outcomes (PSOs) (As per VTU 2022 Scheme)

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### 1. Title

**SOP for Attainment of Course Outcomes (COs), Program Outcomes (POs) and Program Specific Outcomes (PSOs) – VTU 2022 Scheme**

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### 2. Purpose

The purpose of this SOP is to establish a **systematic, transparent and outcome-based mechanism** for measuring, analyzing and improving the attainment of COs, POs and PSOs for programs offered under the **VTU 2022 Scheme**.

This SOP ensures:

- Effective implementation of **Outcome Based Education (OBE)**
- Compliance with **VTU 2022 Scheme curriculum and assessment norms**
- Alignment with **NBA Graduate Attributes**
- Continuous academic improvement through data-driven decisions

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### 3. Scope

This SOP is applicable to:

- All UG programs offered under the **VTU 2022 Scheme**
- All theory, laboratory, skill-based, internship, seminar and project courses
- All faculty members, course coordinators and students
- Direct and indirect assessment processes used for outcome attainment

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### 4. Objectives

- To define a **uniform procedure** for CO, PO and PSO attainment
- To ensure **valid, reliable and measurable assessment**
- To integrate **experiential learning, internships and skill-based courses**



- To support **continuous improvement (CQI)** through corrective actions
- To maintain proper documentation for **NBA, NAAC and Academic Audits**

## 5. Responsibility

Role	Responsibility
Principal	Overall academic governance and approval
Dean (Academics)	Monitoring OBE implementation
Head of Department (HOD)	Department-level execution and compliance
Program Assessment Committee (PAC)	Review of attainment and improvement actions
Course Coordinators	CO mapping, assessment and attainment calculation
Faculty Members	Assessment, evaluation and record maintenance
IQAC	Verification, validation and archival of records

## 6. Identification and Mapping of Outcomes (2022 Scheme)

### 1. Program Outcomes (POs)

- POs are **prescribed by the NBA** and adopted by the institution without modification.

### 2. Program Educational Objectives (PEOs) and Program Specific Outcomes (PSOs)

- PEOs and PSOs are **formulated by the department** through the **Program Assessment Committee (PAC)** and **Department Advisory Board (DAB)**.

### 3. Course Outcomes (COs)

- COs are **defined in the curriculum prescribed by VTU under the 2022 Scheme**.
- Departments may **contextualize COs for effective delivery and assessment**, without deviating from the university-approved syllabus.

### 4. CO–PO–PSO Mapping

- Mapping is carried out using correlation levels:

**1 – Low, 2 – Medium, 3 – High**

- Reviewed and approved at:
  - Department level (PAC/DAB)
  - Institute level (IQAC)



## 7. Assessment Methods (2022 Scheme)

### 7.1 Direct Assessment Tools

Sl. No.	Assessment Tool	Description
1	Continuous Internal Evaluation (CIE)	Three CIE tests for theory courses as per VTU
2	Assignments / Quizzes / ABL	Activity-based learning mapped to COs
3	Laboratory Continuous Assessment	Evaluation based on experiments, record and viva
4	Skill Development Courses	Rubric-based assessment of practical skills
5	Mini Projects	Design, innovation and problem-solving assessment
6	Seminar	Rubric-based evaluation by faculty panel
7	Project Phase Reviews	Phase-wise evaluation as per VTU guidelines
8	University SEE	External evaluation conducted by VTU

### 7.2 Indirect Assessment Tools

Sl. No.	Tool	Description
1	Course Exit Survey	Student feedback on CO attainment
2	Program Exit Survey	Graduate attribute evaluation
3	Alumni Survey	Post-graduation relevance assessment
4	Employer Survey	Industry feedback on graduate performance
5	Internship / IV Feedback	Experiential learning effectiveness

## 8. CO Attainment Methodology (2022 Scheme)

### 8.1 Target Level Setting

Attainment Percentage	Target Level
35% – 60%	Level 1
61% – 70%	Level 2
71% – 100%	Level 3

- Target levels are set considering **course complexity**.
- Targets are reviewed annually for continuous improvement.



## 8.2 CO Attainment Calculation

### Direct Attainment Components & Weightage:

- University SEE: **50%**
- CIE: **40%**
- Other Assessments: **10%**

### Indirect Attainment:

- Course Exit Survey

### Final CO Attainment Formula:

$$\text{Direct Attainment} = (\text{SEE} \times 0.5) + (\text{CIE} \times 0.4) + (\text{Other} \times 0.1)$$

$$\text{Total CO Attainment} = (\text{Direct} \times 0.8) + (\text{Indirect} \times 0.2)$$

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## 9. PO and PSO Attainment Methodology (2022 Scheme)

### 1. Direct PO/PSO Attainment

- Derived from CO attainment through CO–PO–PSO mapping
- Includes contributions from:
  - Projects
  - Internships
  - Skill courses
  - Laboratories

### 2. Indirect PO/PSO Attainment

- Program Exit Survey
- Alumni Survey
- Employer Survey

### Weightage:

- Direct Attainment: **80%**
- Indirect Attainment: **20%**

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## 10. Review, Analysis and Continuous Improvement

- Attainment results are reviewed in:
  - PAC meetings



- DAB meetings
- Gaps are identified and corrective actions include:
- Additional tutorial and remedial classes
- Enhanced ABL and problem-based learning
- Assessment redesign using RBT
- Strengthening internships and project guidance
- **Action Taken Reports (ATR)** are documented and tracked.

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## 11. Documentation and Records

Departments shall maintain:

- CO–PO–PSO mapping matrices (2022 Scheme)
- Question papers, rubrics and assessment tools
- CO, PO and PSO attainment sheets
- Survey analysis reports
- Minutes of PAC/DAB meetings
- Action Taken Reports (ATR)

Records shall be preserved for **minimum 3 academic years**.

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## 12. Review and Revision

- SOP reviewed annually by IQAC
- Revised based on:
- VTU 2022 Scheme updates
- NBA/NAAC guidelines
- Stakeholder feedback

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## 13. Approval

Role	Signature Date
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Course Coordinator

Program Coordinator



Role	Signature Date
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Head of Department

Dean (Academics)

Principal

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**If you want next**

I can:

- Prepare **comparison table (2018 vs 2021 vs 2022 Scheme SOP)**
- Create **flowcharts for CO–PO–PSO attainment**
- Customize this **specifically for Mechanical Engineering – AITM**
- Generate **Excel templates for attainment calculation**