

MCT
MANJARA CHARITABLE TRUST
RAJIV GANDHI INSTITUTE OF TECHNOLOGY, MUMBAI
DEPARTMENT OF MECHANICAL ENGINEERING

Procedure for CO-PO Attainment

In outcome-based education, a “design down” process is employed which moves from POs to Course Outcomes (COs) and outcomes for individual learning experiences. Outcomes at each successive level need to be aligned with, and contribute to, the program outcomes.

To connect high-level learning outcomes (POs) with course content, course outcomes and its assessment is necessary. There is a necessity to bring further clarity and specificity to the program outcomes attainment through course outcome AICTE given the examination reform policy in November 2018. This can be achieved through the following two-step process of identifying Competencies and Performance Indicators (PI).

(1) Identify Competencies to be attained: For each PO define the competencies –different abilities implied by program outcome statement that would generally require different assessment measures. This helps us to create a shared understanding of the competencies we want students to achieve. They serve as an intermediate step to the creation of measurable indicators. It should be noted that, when we consider the program outcome, it looks like, it can be achieved only in the Capstone project. But if we consider the competencies and performance indicators, we start seeing the opportunities of addressing them (and hence PO) in various courses of the program. Once the above process is completed for the program, the assessment of COs for all the courses is done by connecting assessment questions (used in various assessment tools) to the PIs. By following this process, where examination questions map with PIs, we get clarity and better resolution for the assessment of COs and POs.

Assessment Processes used to Gather the Data Upon Which the Evaluation of Course Outcome is Based

- **Summative Assessment:** End Semester exam, Mid Term exam I and II, oral and Practical examination at the end of semester.
- **Continuous Assessment:** Assignments, Lab performance, Case study, presentations, quizzes
- **Project-Based Assessment:**
 - MiniProject in semester (III, IV, V, VI)
 - Major project in Semester VII and VIII.

Calculate the attainment level of CO by direct assessment methods (student performance)

With knowledge of attainment level of CO determine the attainment level of the PO satisfied for the related CO in the given course in terms of correlation levels [1: slight(low) , 2: Moderate (medium) , and 3: substantial(high)]

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Calculate the average attainment of PO_s in percentage and enter the correlation level in CO-PO Matrix based on the target.

| Level of CO attainment | |
|---|-------|
| No. of students having marks > cut-off | Level |
| No. of students having marks ≥ 60% | 3 |
| No. of students having marks 50% to 59% | 2 |
| No. of students having marks 40% to 49% | 1 |

PO attainment calculation with CO-PO matrix table for the course will be as follow

| CO ATTAINMENT LEVEL | INTERNAL EVALUATION | | | | | | | | | | | | | | | | | | | | EXTERNAL EVALUATION | | | | | | | | | | | |
|---|---------------------|-----|-----|-----|-----|---------|-----|-----|-----|-----|-------------|-------|-----|-----|-----|-----|-----|-----|-----|-----|---------------------|------------|-----|------------|----|--------|--------------|-----|----|--|--|--------|
| | TEST I | | | | | TEST II | | | | | EXPERIMENTS | | | | | | | | | | PROJECT | ASSESSMENT | | ASSESSMENT | | | | | | | | |
| | Q1 | Q2 | Q3 | Q4 | Q5 | Total | Q1 | Q2 | Q3 | Q4 | Q5 | Total | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Avg | 1 | IA | ESE | TEST AVERAGE | ESE | | | | |
| Maximum marks → | 5 | 5 | 5 | 5 | 5 | 20 | 10 | 5 | 5 | 5 | 5 | 20 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 20 | 80 | 20 | 80 | | | |
| Mapping CO → | CO1 | CO2 | CO3 | CO4 | CO5 | | CO3 | CO4 | CO3 | CO4 | CO4 | | CO1 | CO2 | CO3 | CO4 | CO5 | CO6 | CO3 | CO4 | CO5 | CO6 | | ALL CO | | ALL CO | | | | | | ALL CO |
| No. of students having marks ≥ 60% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. of students having marks 50% to 59% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. of students having marks 40% to 49% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Internal & External Evaluation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| CALCULATION OF FINAL ATTAINMENT LEVEL | | | | | | | | | |
|---------------------------------------|--------|--------|-----------------------------|-----------------------|--|-------------------|------|------|--|
| Course Outcome | Test 1 | Test 2 | Internal Evaluation Average | University Evaluation | 80% of External+ 20% of internal examination | Attainment Levels | | | |
| | | | | | | 3 | 2 | 1 | |
| CO1 | 2.80 | | 2.80 | 2.60 | 2.64 | 2.64 | 1.74 | 0.87 | |
| CO2 | 2.86 | | 2.86 | 2.60 | 2.65 | 2.65 | 1.75 | 0.88 | |
| CO3 | | 2.92 | 2.92 | 2.60 | 2.66 | 2.66 | 1.76 | 0.88 | |
| CO4 | | 2.94 | 2.94 | 2.60 | 2.67 | 2.67 | 1.76 | 0.88 | |
| CO5 | | | | 2.60 | 2.08 | 2.08 | 1.37 | 0.69 | |
| CO6 | | | | 2.60 | 2.08 | 2.08 | 1.37 | 0.69 | |


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DEPARTMENT OF MECHANICAL ENGINEERING

Program level attainment through Direct tools

| Course Code | Name of Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---------------|----------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| FEC101 | Engineering Mathematics-I | 1.18 | 0.78 | 0.78 | 0.78 | 0.78 | — | — | — | — | — | — | 0.78 | — | — |
| FEC102 | Engineering Physics-I | 1.18 | 0.78 | 0.78 | — | — | — | — | — | — | — | — | 0.78 | — | — |
| FEC103 | Engineering Chemistry-I | 2.01 | 1.08 | 0.93 | 2.81 | 0.93 | 2.33 | 1.85 | — | — | — | — | 0.93 | — | — |
| FEC104 | Engineering Mechanics | 2.13 | 0.71 | — | — | — | — | — | — | — | 0.71 | — | — | 1.00 | 1.00 |
| FEC105 | Basic Electrical Engineering | 1.23 | 1.46 | — | — | — | — | — | — | — | — | — | — | — | — |
| FEL103 | Engineering Mechanics Lab | 2.98 | 0.99 | — | — | — | — | — | — | — | 0.99 | — | — | 1.00 | 1.00 |
| FEL104 | Basic Electrical Engineering Lab | 1.83 | 1.83 | — | — | — | — | — | 0.91 | 2.77 | — | — | — | — | — |
| FEL105 | Basic Workshop Practice - I | 1.79 | 1.09 | 0.83 | — | 0.85 | 2.33 | — | 0.91 | — | 0.85 | — | 0.83 | — | 1.00 |
| FEC201 | Engineering Mathematics-II | 1.99 | 1.19 | 0.88 | 2.81 | 0.89 | — | — | — | — | — | — | 0.88 | — | — |
| FEC202 | Engineering Physics-II | 1.99 | 1.21 | — | — | — | — | — | — | 2.77 | — | — | 0.86 | — | — |
| FEC203 | Engineering Chemistry-II | 2.29 | 1.58 | — | — | — | 1.50 | 2.28 | — | — | — | — | 1.63 | 0.89 | — |


 MANJARA CHARITABLE TRUST
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DEPARTMENT OF MECHANICAL ENGINEERING

Program level attainment through Indirect tools

| DEPARTMENT OF MECHANICAL ENGINEERING | | | | | | | | | | | | | | | |
|--------------------------------------|----------|------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| CALCULATION OF INDIRECT ATTAINMENT | | | | | | | | | | | | | | | |
| TOOLS | | PROGRAM OUTCOMES | | | | | | | | | | | | | |
| | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| PROGRAM EXIT SURVEY | | 2.38 | 2.42 | 2.47 | 2.45 | 2.25 | 2.45 | 2.37 | 2.42 | 2.53 | 2.49 | 2.49 | 2.47 | 2.46 | 2.41 |
| ALUMNI FEEDBACK | | 1.94 | 1.92 | 1.93 | 1.92 | 1.86 | 2.02 | 2.02 | 2.05 | 1.94 | 2.02 | 1.89 | 2.08 | 2.05 | 2.02 |
| PARENTS FEEDBACK | | - | - | - | - | - | 2.43 | 2.52 | 2.47 | 2.46 | 2.42 | 2.52 | 2.5 | 2.43 | 2.43 |
| STUDENT PROFESSIONAL BODIES | AERO | 2 | 1 | 1 | 1 | 2 | - | - | - | 1 | 1 | 1 | 1 | 1.1 | 1 |
| | ASME | 1.7 | 2 | 2.75 | 1.6 | 2.57 | 1.45 | 1.67 | 1.67 | 2.6 | 2.17 | 3 | 1.9 | 1.91 | 1.7 |
| | IIIE | 3 | 2 | 2 | - | 3 | 2 | - | 2 | 2.5 | 2.5 | 2 | 3 | 2 | 2 |
| | ISHRAE | 3 | 1 | - | - | - | - | - | - | 2.2 | 1.6 | 1.5 | 1.5 | - | - |
| | MESA | 1.25 | - | 1 | - | 2 | - | 1 | 3 | 1.25 | 2 | 1 | 1 | 1 | 1 |
| | ROBOTICS | 3 | 2.75 | 3 | 1.5 | 3 | - | - | 2 | 2.33 | 3 | 2 | 1.5 | 1.5 | 1 |
| | SAE | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 3 | 2 | 3 | 2 | 3 | 2 |
| INDUSTR/EMPOYER FEEDBACK | | 1.89 | -s | - | - | - | 2.5 | | 3 | 2 | 1.78 | - | 2.11 | - | - |
| AVERAGE | | 2.12 | 1.76 | 2.02 | 1.58 | 2.33 | 2.12 | 1.93 | 2.18 | 2.16 | 2.09 | 2.04 | 1.91 | 1.94 | 1.73 |
| 20% OF INDIRECT ATTAINMENT | | 0.42 | 0.35 | 0.40 | 0.32 | 0.47 | 0.42 | 0.39 | 0.44 | 0.43 | 0.42 | 0.41 | 0.38 | 0.39 | 0.35 |

Program level attainment through direct and Indirect tools

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| DIRECT ATTAINMENT | 2.07 | 1.69 | 1.42 | 1.67 | 1.72 | 2.11 | 1.82 | 1.83 | 2.10 | 1.59 | 1.87 | 1.59 | 1.20 | 1.27 |
| 80% OF DIRECT ATTAINMENT | 1.65 | 1.35 | 1.14 | 1.34 | 1.38 | 1.69 | 1.46 | 1.46 | 1.68 | 1.28 | 1.50 | 1.27 | 0.96 | 1.02 |
| INDIRECT ATTAINMENT | 2.12 | 1.76 | 2.02 | 1.58 | 2.33 | 2.12 | 1.93 | 2.18 | 2.16 | 2.09 | 2.04 | 1.91 | 1.94 | 1.73 |
| 20% OF INDIRECT ATTAINMENT | 0.42 | 0.35 | 0.40 | 0.32 | 0.47 | 0.42 | 0.39 | 0.44 | 0.43 | 0.42 | 0.41 | 0.38 | 0.39 | 0.35 |
| TOTAL PO ATTAINMENT | 2.08 | 1.70 | 1.54 | 1.65 | 1.84 | 2.11 | 1.84 | 1.90 | 2.11 | 1.69 | 1.91 | 1.65 | 1.35 | 1.36 |