Conceptual Project-I: CO-PO Mapping and Evaluation Guidelines

1.1 Course Outcome (CO) and Program Outcome (PO) Mapping

The Conceptual Project for B. Tech 3rd Semester is designed to align with the program outcomes (POs) of the B. Tech curriculum, emphasizing problem-solving, technical proficiency, innovation, and industry/societal relevance. Below is the **CO-PO Mapping**, which links specific Course Outcomes (COs) for the Conceptual Project to the Program Outcomes (POs). The mapping uses a correlation scale: **3 (High)**, **2 (Moderate)**, **1 (Low)**, or **- (No Correlation)**.

❖ Course Outcomes (COs)

The Conceptual Project aims to achieve the following outcomes:

- **CO1**: Identify and define a technical or societal problem with clear objectives and conduct a review of existing approaches.
- **CO2**: Develop a conceptual framework or model for a potential solution using appropriate preliminary tools and methodologies.
- **CO3**: Demonstrate creativity and originality in proposing solutions while considering societal, ethical, and sustainability aspects.
- **CO4**: Communicate project concepts effectively through reports and presentations, and collaborate in teams with professional and ethical practices.

❖ Program Outcomes (POs)

The B. Tech program outcomes (aligned with internal academic policies) are:

- **PO1**: Engineering Knowledge: Apply knowledge of mathematics, science, and engineering fundamentals to solve complex problems.
- **PO2**: Problem Analysis: Identify, formulate, and analyze complex engineering problems using first principles.

- **PO3**: Design/Development of Solutions: Design solutions for complex engineering problems with appropriate consideration for societal, cultural, and environmental factors.
- **PO4**: Investigation: Conduct investigations of complex problems using research-based knowledge and methods.
- **PO5**: Modern Tool Usage: Apply modern engineering tools and techniques for solving engineering problems.
- **PO6**: Engineer and Society: Assess societal, health, safety, legal, and cultural issues relevant to engineering practice.
- **PO7**: Environment and Sustainability: Understand the impact of engineering solutions in environmental and sustainability contexts.
- **PO8**: Ethics: Apply ethical principles and commit to professional ethics and responsibilities.
- **PO9**: Individual and Teamwork: Function effectively as an individual and in diverse teams.
- **PO10**: Communication: Communicate effectively with technical and non-technical audiences through reports and presentations.
- **PO11**: Project Management and Finance: Apply project management principles and consider economic factors in engineering practice.
- **PO12**: Lifelong Learning: Recognize the need for and engage in independent and lifelong learning.

❖ **CO-PO Mapping Table**

The table below maps each Course Outcome to the Program Outcomes, with correlation levels (3: High, 2: Moderate, 1: Low, -: No Correlation).

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	2	1	1	-	1	-	1
CO2	3	3	3	3	3	2	2	1	1	-	2	2
CO3	2	2	3	3	2	3	2	2	-	-	1	2
CO4	-	-	-	-	-	2	1	3	3	3	3	1

Justification:

- **CO1 (Problem Identification)**: Strongly aligns with PO1 (engineering knowledge) and PO2 (problem analysis) by requiring students to apply fundamentals to identify real-world problems. Moderately aligns with PO3, PO4, PO6, and PO7 through preliminary design considerations, investigation, and awareness of societal/environmental aspects.
- **CO2 (Technology Review)**: Strong alignment with PO3 (design/development of solutions), PO4 (investigation), and PO5 (modern tool usage) for developing solution frameworks using appropriate methodologies. Moderate alignment with PO1, PO2, PO7, PO8, PO9, PO11, and PO12 as students analyze feasibility, consider sustainability, ethics, teamwork, project planning, and lifelong learning.
- **CO3 (Design and Implementation)**: Strong alignment with PO3 (design/development) and PO4 (investigation) for proposing innovative solutions. Moderately aligns with PO6 (society), PO7 (sustainability), PO8 (ethics), and PO12 (lifelong learning) as students consider societal impact, ethical values, and continuous learning in developing ideas.
- **CO4 (Novelty)**: Strong alignment with PO10 (communication) and PO9 (teamwork) by requiring students to present ideas clearly and work collaboratively. Moderately

aligns with PO6 (society), PO8 (ethics), and PO11 (project management/finance) since teamwork, ethical practices, and organizational skills are part of the project execution.

1.2 Conceptual Project Evaluation Guidelines and Rubrics

The Conceptual Project evaluations occur in three stages: Initial Proposal Review (Week 4, 20% weightage), Mid-Term Review (Week 8, 30% weightage), and Final Evaluation (Week 12, 50% weightage). Below are the detailed guidelines and rubrics, ensuring alignment with the COs and POs.

❖ **General Guidelines for All Evaluations**

- **Panel**: Faculty Mentor, Program Director, and an external industry/academic expert.
- **Format**: 15-minute presentation + 5-minute Q&A per team.
- **Presentation Tips**:
  - **Slide Design**: Use consistent formatting (font size: 24 for headings, 18 for text). Avoid clutter. Include visuals (diagrams, charts, screenshots).
  - **Content**: Focus on problem, methodology, results, and impact. Use labeled figures/tables.
  - **Delivery**: Practice for clear, confident delivery. Address Q&A concisely.
  - **Time Management**: Adhere to the 15-minute limit.
- **Submission Requirements**: Reports must be plagiarism-free (<15% similarity, e.g., Turnitin) and follow formatting guidelines (Times New Roman, 12-point, 1.5 spacing; labeled figures/tables; page numbers).
- **Ethical Compliance**: Projects involving human subjects, animals, or sensitive data require ethical clearance from the institute's Ethics Committee.
- **Mentor Interaction**: Bi-weekly meetings with Faculty Mentor; maintain a project log.
- **Archiving**: All records archived for internal purposes.

❖ **Evaluation I: Initial Proposal Review (Week 4)**

Purpose: Assess topic feasibility and alignment with program outcomes (CO1, CO2, CO3, CO4).

Weightage: 20%.

Submission: 1-page proposal (problem statement, objectives, expected outcomes).

Presentation Structure:

- **Title Slide**: Project Title, Student Name(s) with UGID(s), Department, Institution, Supervisor Name.
- **Introduction**: Background, domain knowledge, project significance (CO1, PO1, PO6).
- **Problem Statement**: Clear definition of the technical/societal problem, context, and scope (CO1, PO2, PO6).
- **Project Objectives**: SMART goals addressing challenges and needs (CO1, PO2, PO3).
- **Literature Review / Existing Work**: Initial findings on technologies/studies, highlighting gaps (CO1, CO2, PO2, PO4).
- **Novelty**: Potential unique contribution (CO4, PO3, PO4).
- **Proposed Methodology**: Conceptual framework/model with preliminary design and block diagram (CO2, CO3, PO3, PO5).
- **Tools and Technologies**: Planned software/hardware (CO2, CO3, PO5).
- **Timeline / Work Plan**: Gantt chart with key phases (CO2, PO11).
- **Current Progress**: Initial steps (e.g., topic research, literature review) (CO1, CO2, PO4).
- **Individual Responsibilities & Contributions**: Team roles (CO6, PO9).
- **Team Members' Roles & Contributions**: Team roles and division of tasks (CO4, PO9).
- **Skillset Gained**: Anticipated skills and knowledge outcomes (CO2, CO3, PO12).
- **Challenges Faced**: Potential obstacles (CO2, CO4, PO9, PO11).
- **Future Scope**: Optional; long-term potential (CO3, PO6, PO7, PO12).

Rubric:

Criterion	Weightage	Excellent (4)	Good (3)	Fair (2)	Poor (1)	Score Calculation	CO-PO Alignment
Problem Identification	20%	Clearly defined, highly relevant, deep context and scope.	Well-defined, relevant, good context.	Somewhat defined, lacks depth.	Vague, irrelevant, poorly articulated.	(Points × 20%)	CO1 (PO1, PO2, PO6)
Methodology	25%	Comprehensive, innovative, clear tools/timelines/ diagrams, fully aligns with objectives.	Solid, detailed, appropriate tools/timelines, mostly aligns.	Basic, some details missing, partial alignment.	Incomplete, unclear, misaligned.	(Points × 25%)	CO2 (PO3, PO4, PO5, PO11)
Innovation and Industry Relevance	25%	High novelty, addresses significant gaps, strong industry/societal impact.	Good innovation, clear impact.	Some innovation, limited impact.	Little/no innovation or relevance.	(Points × 25%)	CO3 (PO3, PO4, PO6, PO7, PO12)
Presentation Clarity	15%	Engaging, well-structured, visually appealing, confident Q&A within time.	Clear, structured, good visuals, adequate Q&A.	Somewhat clear, disorganized, basic Q&A.	Unclear, poorly structured, poor Q&A.	(Points × 15%)	CO4 (PO9, PO10)
Report Quality	15%	Professionally formatted, plagiarism-free (<15%), concise, adheres to guidelines, excellent writing.	Well-formatted, meets most guidelines, good writing.	Meets basic guidelines, formatting/writing issues.	Poorly formatted, exceeds plagiarism, deviates from guidelines.	(Points × 15%)	CO5 (PO10, PO8)

Total Score: Sum of score calculations (out of 100).

Notes: Feedback includes qualitative aspects (ethics, mentor interaction). Passing threshold: 60%.

❖ **Evaluation II: Mid-Term Review (Week 8)**

Purpose: Evaluate progress, methodology, and preliminary results (CO1, CO2, CO3, CO4).

Weightage: 30%.

Submission: Updated report with progress details (Technology Review, Methodology, Preliminary Results).

Presentation Structure:

- **Title Slide**: Project Title, Student Name(s) with UGID(s), Department, Institution, Supervisor Name.
- **Introduction**: Recap background and significance (CO1, PO1, PO6).
- **Problem Statement**: Restate with refinements (CO1, PO2, PO6).
- **Literature / Technology Review / Existing Work**: Key findings, gaps, and project relevance (CO1, CO2, PO2, PO4).
- **Project Objectives**: Review SMART goals and progress (CO1, PO2, PO3).
- **Novelty**: Unique contribution addressing gaps (CO3, PO3, PO4, PO6, PO7, PO12).
- **Proposed Methodology**: Detailed process with block diagram/flowchart (CO2, CO3, PO3, PO5).
- **Tools and Technologies**: Used software/hardware (CO2, CO3, PO5).
- **Timeline / Work Plan**: Updated Gantt chart (CO2, CO3, PO11).
- **Current Progress**: Preliminary results/prototypes with visuals (CO2, CO3, CO4, PO4, PO5).
- **Individual Responsibilities & Contributions**: Roles and contributions (CO4, PO9).
- **Skillset Gained**: Developed skills (CO4, PO12).

- **Challenges Faced**: Obstacles and solutions (CO4, PO9, PO11).
- **Future Scope**: Next steps and long-term potential (CO3, CO4, PO6, PO7).

Rubric:

Criterion	Weightage	Excellent (4)	Good (3)	Fair (2)	Poor (1)	Score Calculation	CO-PO Alignment
Problem Identification	20%	Clearly restated, highly relevant, contextualized with progress.	Restated clearly, good context.	Restated, lacks depth/clarity.	Vague, not updated.	(Points × 20%)	CO1 (PO1, PO2, PO6)
Methodology	25%	Detailed, innovative, well-executed, clear tools/diagrams, fully aligns.	Solid, appropriate tools, mostly aligns.	Basic, gaps in execution, partial alignment.	Incomplete, misaligned.	(Points × 25%)	CO2 & CO3 (PO3, PO5, PO11)
Innovation and Industry Relevance	25%	Preliminary results show high novelty, strong impact potential.	Good novelty, clear impact.	Some novelty, limited impact.	Little/no novelty or relevance.	(Points × 25%)	CO3 (PO3, PO4, PO6, PO7, PO12)
Presentation Clarity	15%	Engaging, structured, compelling visuals, confident Q&A.	Clear, good visuals, adequate Q&A.	Somewhat clear, disorganized, basic Q&A.	Unclear, poor Q&A.	(Points × 15%)	CO4 (PO9, PO10)
Report Quality	15%	Professionally formatted, plagiarism-free, concise, adheres to guidelines.	Well-formatted, meets most guidelines.	Basic guidelines met, issues in formatting/writing.	Poorly formatted, exceeds plagiarism.	(Points × 15%)	CO4 (PO8, PO10, PO11)

Total Score: Sum of score calculations (out of 100).

Notes: Feedback includes ethics and mentor interaction. Passing threshold: 60%.

❖ **Evaluation III: Final Evaluation (Week 12)**

Purpose: Assess outcomes, report quality, and overall achievement (CO1, CO2, CO3, CO4).

Weightage: 50%.

Submission: Final report (3,000–4,000 words, PDF, plagiarism-free <15%).

Deadline: _____

Presentation Structure:

- **Title Slide**: Project Title, Student Name(s) with UGID(s), Department, Institution, Supervisor Name.
- **Introduction**: Recap background and significance (CO1, PO1, PO6).
- **Problem Statement**: Restate problem and boundaries (CO1, PO2, PO6).
- **Project Objectives**: Review SMART goals and achievements (CO1, PO2, PO3).
- **Literature Review / Existing Work**: Gaps addressed and project alignment (CO2, PO2, PO4).
- **Novelty**: Unique contributions with evidence (CO3, PO3, PO4, PO6, PO7, PO12).
- **Proposed Methodology**: Summarized process with block diagram/flowchart (CO2, CO3, PO3, PO5).
- **Tools and Technologies**: Recap effectiveness and usage (CO2, CO3, PO5).
- **Timeline / Work Plan**: Completed Gantt chart (CO2, CO3, PO11).
- **Results/Outcomes**: Deliverables (e.g., prototype, metrics) with visuals (CO2, CO3, CO4, PO4, PO5).
- **Individual Responsibilities & Contributions**: Final roles and impacts (CO4, PO9).
- **Team Members' Roles & Contributions**: Overall execution and collaboration (CO4, PO9).

- **Skillset Gained**: Acquired skills during the project (CO4, PO12).
- **Challenges Faced**: Overcome challenges and lessons learned (CO4, PO9, PO11).
- **Industry/Societal Impact**: Practical benefits of the solution (CO3, CO4, PO6, PO7).
- **Conclusion**: Key findings, limitations, and significance (CO4, PO10).
- **Future Scope**: Improvements or next steps for Conceptual Project-II (CO3, CO4, PO6, PO7).

Rubric:

Criterion	Weightage	Excellent (4)	Good (3)	Fair (2)	Poor (1)	Score Calculation	CO-PO Alignment
Problem Identification	20%	Clearly articulated, relevant, contextualized with outcomes.	Well-articulated, good context.	Somewhat clear, lacks depth.	Vague, poorly linked to outcomes.	(Points × 20%)	CO1 (PO1, PO2, PO6)
Methodology	25%	Comprehensive, innovative, fully executed, clear tools/results.	Solid, well-executed, mostly achieves objectives.	Basic, partial execution, gaps.	Incomplete, fails objectives.	(Points × 25%)	CO2 & CO3 (PO3, PO5, PO11)
Innovation and Industry Relevance	25%	High novelty, significant gaps addressed, strong impact.	Good novelty, clear impact.	Some novelty, limited impact.	Little/no novelty or relevance.	(Points × 25%)	CO3 (PO3, PO4, PO6, PO7, PO12)

Presentation Clarity	15%	Engaging, structured, compelling visuals, insightful Q&A.	Clear, good visuals, adequate Q&A.	Somewhat clear, disorganized, basic Q&A.	Unclear, poor Q&A.	(Points × 15%)	CO4 (PO9, PO10)
Report Quality	15%	Professionally formatted, plagiarism-free, concise, adheres to guidelines.	Well-formatted, meets most guidelines.	Basic guidelines met, issues in formatting/writing.	Poorly formatted, exceeds plagiarism.	(Points × 15%)	CO4 (PO8, PO10, PO11)

Total Score: Sum of score calculations (out of 100).

Notes: Feedback includes ethics, team continuity, and mentor interaction. Passing threshold: 60%.

1.3 General Notes

- **Team Size**: 1-5 members, consistent across semesters (CO4, PO9).
- **Topic Alignment**: Must address real-world challenges (e.g., IoT, traffic management) (CO1, CO3, PO6, PO7).
- **Ethical Considerations**: Obtain clearance for sensitive data (CO4, PO8).
- **Archiving**: All project records to be archived for quality assurance and future reference (CO4, PO12).

This document ensures alignment between Conceptual Project evaluations and B. Tech program outcomes and supporting student development. Consult Faculty Mentor for clarifications.