



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

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## **B.TECH PROJECT WORK EVALUATION / ASSESSMENT GUIDELINES**

The scope of this document is to elaborate the guidelines and rubrics for the evaluation and assessment of B.Tech Project Work based on Outcome Based Education (OBE) to successfully meet the Program Outcomes / Program Specific Outcomes (PO / PSO) in accordance with the specifications of National Board of Accreditation (NBA).

The project work shall be innovative in nature and explore the research bent of the mind of the student. A student shall carry out the project work under the supervision of a member of the faculty or may undertake to execute the project in collaboration with an Industry, R&D organization or another academic institution/University where sufficient facilities exist to carry out the project work.

Project report will be assessed for 100 marks in total. The Continuous Internal Assessment (CIA) shall be for 30 marks and the Semester End Examination (SEE) shall be for remaining 70 marks based on publication, report, presentation, execution and viva-voce.

### **1. B.TECH PROJECT WORK OBJECTIVES:**

**This course will expose students:**

- I. To offer an opportunity to demonstrate their competence in laboratory work.
- II. To integrate the knowledge gained in courses studied.
- III. To allow the exercise maturity, initiative and creative ability.
- IV. To apply communication skills, both oral and written, to communicate results, concepts and ideas.
- V. To solve problems of a non-routine nature.

### **2. B.TECH PROJECT WORK LEARNING OUTCOMES**

**By the end of the course, students are able to show competence in the following areas:**

- CO 1: Ability to plan and implement an investigative or developmental project given general objectives and guidelines.
- CO 2: In-depth skill to use some laboratory, modern tools and techniques.
- CO 3: Ability to analyze data to produce useful information and to draw conclusions by systematic deduction.
- CO 4: Facilitate significant individualized interactions between faculty members and students through a multi-term research experience.
- CO 5: Ability to communicate results, concepts, analyses and ideas in written and oral form.
- CO 6: Conduct an extended independent investigation that results in the production of a research thesis.

### 3. PROGRAM OUTCOMES

A graduate of the Engineering Program will demonstrate:

- 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, review research literature, and analyze 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 modeling 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, and 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.

## 4. PROGRAM SPECIFIC OUTCOMES

**Graduates will have an ability to:**

**PSO1:** Understand, design and analyze computer programs in the areas related to Algorithms, System Software, Web design, Big data, Artificial Intelligence, Machine Learning and Networking.

**PSO2:** Focus on improving software reliability, network security or information retrieval systems.

**PSO3:** Make use of modern computer tools for creating innovative career paths, to be an entrepreneur and desire for higher studies.

## 5. CO – PO / PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	3							3	3	3		
CO2				2	3							3		3	3
CO3	2	3	3	3	3	2	2					3	3	3	
CO4								3	3			3			2
CO5										3		3		3	3
CO6				3		2						3	3	3	3
	2	3	3	2.75	3	2	2	3	3	3	3	3	3	3	2.75

## 6. EVALUATION / ASSESSMENT GUIDELINES:

Students are evaluated based on their work progress. Therefore, students are expected to meet their respective supervisors regularly to present their progress. In addition, students are required to maintain their logbooks accordingly. Only students with satisfactory progress are allowed to submit their technical paper publication and project report. Students also are required to present their complete project work in the form of well-structured report.

**The motive is to enhance students' writing skill and it is popularly considered as the ultimate task in B.Tech program.** Both work progress and project report will be monitored by the project supervisor. As a summarization, the assessment consists of four major sections as depicted in Table 1.

**Table 1. The major sections of the assessment**

Section Description	Marks	
	FSI	Non FSI
<b>Continuous Internal Assessment (CIA)</b>	<b>30</b>	<b>30</b>
<b>Semester End Examination (SEE)</b>		
• <b>Technical Paper Evaluation (TPE)</b>	<b>30</b>	<b>10</b>
• <b>Project Presentation Evaluation (PPE)</b>	<b>20</b>	<b>30</b>
• <b>Final Report Evaluation (FRE)</b>	<b>20</b>	<b>30</b>

## 7. CONTINUOUS INTERNAL ASSESSMENT (CIA)

The Continuous Internal Assessment (CIA) shall be for 30 marks and done by a Department Review Committee (DRC) comprising the supervisor, project coordinator, Head of the department and two senior professors. This section evaluates the students' progress during the work that regularly submitting to the supervisor and the assessment is made by DRC as mentioned earlier.

First review of CIA is done at the end of VII semester on the progress for 30 marks and students should submit project synopsis summarizing the work done in VII semester. The project is expected to be completed by the end of VIII semester. A second review is conducted on the progress for 30 marks during VIII semester. A third review is conducted for another 30 marks before the report is submitted on completion of the project. The final CIA marks will be the average of the three assessments.

Each assessment of the PRC should follow the evaluation guidelines and rubrics as mentioned in Table 2, and Table 3.

**Table 2. CO – PO Specifications for CIA**

S. No	Specification	CO	PO	Maximum Marks
1	<b>Attendance:</b> Ability to frequently meet with supervisor	CO4	PO8, PO9, PO12, PSO3	5
2	<b>Creativity:</b> Ability to gather information and resources for the given problem	CO1	PO1, PO2, PO3, PO4, PO11, PO12, PSO1	5
3	<b>Work progress:</b> Ability to use and record any work progress in a logbook for a given timeline	CO2, CO5	PO4, PO5, PO12, PSO2, PSO3 PO10, PO12, PSO2, PSO3	10
4	<b>Demonstration and finding of results:</b> Ability to demonstrate and analyze results with appropriate reasonable explanation	CO3, CO6	PO1 to PO7, PO12, PSO1, PSO2 PO4, PO6, PO12, PSO1, PSO2, PSO3	10
<b>Total</b>				<b>30</b>

**Table 3. Rubrics Evaluation form for CIA**

S. No	Specification	Very Weak 1	Weak 2	Moderate 3	Strong 4	Very Strong 5
1	<b>Attendance</b>	Meet less than 3 times per semester	Meet more than 3 times per semester but less than 5 times	Meet more than 5 times per semester but less than 7 times	Meet more than 9 times per semester but less than 10 times	Meet more than 10 times per semester
2	<b>Creativity</b>	Too Dependent and not creative	Dependent but show some creativity	Independent, show some creativity	Independent and creative	Highly independent, creative and can work with minimum supervision
3	<b>Work progress</b>	No logbook and no progress	No logbook with poor progress	Logbook maintained with poor progress	Logbook maintained with good progress	Logbook maintained with advanced progress
4	<b>Demonstration and finding of results</b>	No element met	Only results are demonstrated	Results demonstrated and analyzed critically, but no explanation of results	Results demonstrated and analyzed critically with inaccurate explanation of results	Results demonstrated and analyzed critically with accurate explanation of results

## 8. SEMESTER END EXAMINATION (SEE)

The Semester End Examination (SEE) shall be for remaining 70 marks based on publication, report, presentation, execution and viva-voce and done by a Project Review Committee (PRC) comprising the supervisor, project coordinator, Head of the department, Dean (UG & PG), Dean (R&D) and an examiner nominated by the Principal from the panel of experts recommended by Chairman, BOS. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

### 8.1 Technical Paper Evaluation (TPE)

The evaluation and assessment will be done at the end of the semester during SEE as per the evaluation guidelines and rubrics as mentioned in Table 4, and Table 5. The assessment is for 100 Marks and the marks obtained will then be relatively rounded for a maximum of 30 or 10 marks for FSI or Non-FSI respectively.

**Table 4. CO – PO Specifications for TPE**

S. No	Specification	CO	PO	Maximum Marks
1	<b>Abstract:</b> Objective(s), Scope of Study, Methodology & Findings	CO1	PO1, PO2, PO3, PO4, PO11, PO12, PSO1	10
2	<b>Introduction:</b> Overview of Study, Problem Statement, Problem Identification, Significance of the Study, Objective and Scope of Study	CO4	PO8, PO9, PO12, PSO3	20
3	<b>Methodology:</b> Algorithm, flow charts or pseudo codes of the programming codes OR/AND, hardware design, block diagram, appropriate circuitry and relevant techniques towards achieving the project outcomes	CO2,	PO4, PO5, PO12, PSO2, PSO3	30
4	<b>Results and Discussion:</b> Exhibit the significant results of the project, Discuss and analyze the results of the project	CO3	PO1 to PO7, PO12, PSO1, PSO2	20
5	<b>Conclusion:</b> Students should be able to conclude the findings in addressing the objective of the project & Recommendation for future work	CO6	PO4, PO6, PO12, PSO2, PSO3	10
6	<b>Format:</b> Written according to format	CO5	PO10, PO12, PSO2, PSO3	10
<b>Total</b>				<b>100</b>

**Table 5. Rubrics Evaluation form for TPE**

S.No	Specification	Very Weak 1	Weak 2	Moderate 3	Strong 4	Very Strong 5
1	<b>Abstract</b>	Not clearly stated	Only 1 element clearly stated	Only 2 elements clearly stated	Only 3 elements clearly stated	All elements clearly stated
2	<b>Introduction</b>	Not clearly stated	Only 1 element clearly stated	Only 2 elements clearly stated	Only 3 elements clearly stated	All elements clearly stated
3	<b>Methodology</b>	Only 1 element fulfilled but not clearly stated	Only 1 element fulfilled and clearly stated	All elements fulfilled but not clearly stated	All elements fulfilled but 1 element not clearly stated	All elements fulfilled and clearly stated
4	<b>Results and Discussion</b>	Results do not meet project's objective	Results are available without	Results are available with wrong analysis	Results are available with correct analysis and	Results are available with correct

			analysis and discussion	and without discussion	without discussion	analysis and discussion
5	<b>Conclusion</b>	No conclusion on the achievement of project objectives, No recommendation of future work	Only 1 element fulfilled but not clearly stated	All element fulfilled but not clearly stated	All element fulfilled but only 1 element clearly stated	All element fulfilled and clearly stated
6	<b>Format</b>	Wrong Paper structure and wrong format	Wrong paper structure but partially wrong format	Correct paper structure with more than 2 wrong formatting elements	Correct paper structure with less than or equal to 2 formatting elements	Correct paper and Correct Format

## 8.2 Project Presentation Evaluation (PPE)

The evaluation and assessment will be done at the end of the semester during SEE as per the evaluation guidelines and rubrics as mentioned in Table 6, and Table 7. The assessment is for 100 Marks and the marks obtained will then be relatively rounded for a maximum of 20 or 30 marks for FSI or Non-FSI respectively.

**Table 6. CO – PO Specifications for PPE**

S. No	Specification	CO	PO	Maximum Marks
1	<b>Engagement:</b> Appearance, gesture, voice & eye contact	CO4	PO8, PO9, PO12, PSO3	<b>20</b>
2	<b>Presentation Skills:</b> Suitable Tone of Voice, Fluent English usage, Effective Use of Presentation Aids, Convincing	CO5	PO10, PO12, PSO2, PSO3	<b>30</b>
3	<b>Content:</b> The presentation slides should consist the followings: Introduction, Methodology / Project work, Results and Discussion, Conclusion and Recommendation	CO3, CO6	PO1 to PO7, PO12, PSO1, PSO2 PO4, PO6, PO12, PSO1, PSO2, PSO3	<b>20</b>
4	<b>Question and Answers:</b> Ability to answer questions convincingly.	CO5	PO10, PO12, PSO2, PSO3	<b>30</b>
<b>Total</b>				<b>100</b>

**Table 7. Rubrics Evaluation form for PPE**

S.No	Specification	Very Weak 1	Weak 2	Moderate 3	Strong 4	Very Strong 5
1	<b>Engagement</b>	Not dressed formally, no facial expression or eye contact	Not dressed formally, satisfactory facial expression and eye contact	Dressed formally, no facial expression and eye contact	dressed formally, regular facial expression and eye contact	dressed formally, consistent facial expression /eye contact
2	<b>Presentation Skills</b>	No element is fulfilled	Only 1 element is fulfilled	Only 2 elements are fulfilled	Only 3 elements are fulfilled	All elements are fulfilled
3	<b>Content</b>	No element is fulfilled	Only 1 element is fulfilled	Only 2 elements are fulfilled	Only 3 elements are fulfilled	All elements are fulfilled

4	<b>Questions and Answers</b>	No Answers	Answers not related to questions	Answers related to questions with poor points	Answers related to questions with good points	Good expression of ideas, very convincing
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### 8.3 Final Report Evaluation (FRE)

The evaluation and assessment will be done at the end of the semester during SEE as per the evaluation guidelines and rubrics as mentioned in Table 8, and Table 9. The assessment is for 100 Marks and the marks obtained will then be relatively rounded for a maximum of 20 or 30 marks for FSI or Non-FSI respectively.

**Table 8. CO – PO Specifications for FRE**

S. No	Specification	CO	PO	Maximum Marks
1	<b>Abstract:</b> Students should be able to briefly summarize what has been done, and also demonstrate the findings of the project	CO1	PO1, PO2, PO3, PO4, PO11, PO12, PSO1	<b>10</b>
2	<b>Introduction :</b> Background of Study, Problem Statement, Problem Identification, Significance of the study, Objective, Scope of Work & Thesis Organization	CO4	PO8, PO9, PO12, PSO3	<b>10</b>
3	<b>Literature Review:</b> Students should be able to review the references within the scope of study & Students should also be able to perform analysis on previous works	CO3	PO1 to PO7, PO12, PSO1, PSO2	<b>10</b>
4	<b>Methodology/Project Work:</b> Student should include the algorithm, flow charts or pseudo codes of the programming codes OR/AND; Students should include the hardware design, block diagram, appropriate circuitry and relevant techniques towards achieving the project outcomes	CO2	PO4, PO5, PO12, PSO2, PSO3	<b>30</b>
5	<b>Results and Discussion:</b> Students should exhibit the significant results of the project, Students should be able to discuss and analyze the results of the project	CO3	PO1 to PO7, PO12, PSO1, PSO2	<b>20</b>
6	<b>Conclusion:</b> Students should be able to conclude the findings in addressing the objective of the project	CO6	PO4, PO6, PO12, PSO1, PSO2, PSO3	<b>10</b>
7	<b>References:</b> Students should write the references in accordance to the specific format (i.e. IEEE format)	CO5	PO10, PO12, PSO2, PSO3	<b>5</b>
8	<b>Others:</b> Writing Style, Grammar & Compliance to the FYP standard/ guideline	CO5	PO10, PO12, PSO2, PSO3	<b>5</b>
<b>Total</b>				<b>100</b>

**Table 9. Rubrics Evaluation form for FRE**

S. No	Specification	Very Weak 1	Weak 2	Moderate 3	Strong 4	Very Strong 5
1	<b>Abstract</b>	Not clearly stated	Only 1 element clearly stated	Only 2 elements clearly stated	Only 3 elements clearly stated	All elements clearly stated
2	<b>Introduction</b>	Not clearly stated	Only 1 element clearly stated	Only 2 elements clearly stated	Only 3 elements clearly stated	All elements clearly stated

3	<b>Literature Review</b>	Literature Review irrelevant to study	Explain previous studies, but no discussions on pros and cons	Explain previous studies, with insufficient discussions on pros and cons	Explain previous Studies, with good discussions on pros and cons. No explanation of the need of study at the end	Explain previous studies related with good discussions on pros and cons, and finally explain the need of the study
4	<b>Methodology /Project Work</b>	No relevant flowchart or block diagram and there is no procedures or techniques or experimental setup	No relevant flowchart or block Diagram. The procedures or techniques or experimental setup are not in sequence, illogical, incomplete and unclear	There is relevant flowchart or block diagram and the procedures or techniques or experimental setup are partially in sequence, logical, complete and partially clear	There is relevant flowchart or block diagram and the procedures or techniques or experimental setup are in sequence, logical, complete and partially clear	There is relevant flowchart or block diagram and procedures or techniques or experimental setup are in sequence, logical, complete and very clear
5	<b>Results and Discussion</b>	Results do not meet project's objective	Results are available without analysis and discussion	Results are available with wrong analysis and without discussion	Results are available with correct analysis and without discussion	Results are available with correct analysis and discussion
6	<b>Conclusion</b>	No conclusion on the achievement of project objectives, No recommendation of future work	Only 1 element fulfilled but not clearly stated	All element fulfilled but not clearly stated	All element fulfilled but only 1 element clearly stated	All element fulfilled and clearly stated
7	<b>References</b>	All references are in incorrect format	More than 5 references are in incorrect format	More than 3 references and less than or equal to 5 references are in incorrect format	More than 1 references and less than or equal to 3 references are in incorrect format	All references are in correct format
8	<b>Others</b>	Very frequently used wrong choice of words with more than 30 grammatical errors. Wrong citations observed and does not follow the guidelines at all	Very seldom Used wrong choice of words with more than 20 grammatical error but less than or equal to 30 grammatical error. Wrong citations observed and does not follow the guidelines at all	Correctly used choice of words with more than 10 grammatical error but less than or equal to 20 grammatical errors. Correct citations observed and follow the guidelines	Correctly used choice of words and exists good transitions between statements. Has more than 5 grammatical errors but less than or equal to 10 grammatical errors. Correct citations observed and follow the guidelines	Good variation in using choice of words with good transitions and coherence between statements. Has less than 5 grammatical error with proper citations and compliance to guidelines