

2.6.2 Attainment of Program Outcomes and Course Outcomes

- Program outcomes (POs) & Program Specific Outcomes (PSOs)
- Processes used for the assessment of attainment of Course Outcomes
- Processes used for the assessment of attainment of Program Outcomes and Program Specific Outcomes

Program Outcomes for B.Tech Information Technology stated by the Department of Information Technology

PROGRAM OUTCOMES	
1.	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. (Engineering Knowledge)
2.	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. (Problem analysis)
3.	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. (Design/development of solutions)
4.	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. (Conduct investigations of complex problems)
5.	Create, Select and apply appropriate techniques, resources, and modern IT tools including prediction and modeling to computing related complex engineering activities with an understanding of the limitations. (Modern tool usage)
6.	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional computer science and engineering practice (The Engineer and society)
7.	Understand the impact of the professional computer science and design solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. (Environment and sustainability)
8.	Apply ethical principles and commit to professional ethics and responsibilities and norms of the computer science and design practice. (Ethics)
9.	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. (Individual and team work)
10.	Communicate effectively on complex computer science and design 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. (Communication)
11.	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 cost effective projects in multidisciplinary environments. (Project management and finance)
12.	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. (Life-long learning)

**Program Specific Outcomes for B.Tech Information Technology stated by
the Department of Information Technology**

PROGRAM SPECIFIC OUTCOMES	
The Information Technology Graduates will be able to:	
1.	Design software solutions using programming skills and computing technologies. [Programming]
2.	Design and implement data communication system using various ITcomponents. [Networking]

Processes used for the Assessment of Attainment of Course Outcomes (COs)

- The Course Outcomes are mapped with the respective assessment tools like tests, assignment, seminar, Mini Project, lab exercise, case study and end semester exam questions.
- The evaluation of attainment of COs is done based on the performance of the students in the mapped assessments in the Continuous Internal Examinations (CIE) and the Semester End Examinations (SEE).
- The Course Committee evaluates the attainment of COs and prepares the report of CO attainment along with the suggestions for the improvement.
- The Program wise CO attainment is analyzed by the Program Assessment Committee (PAC) and it reviews the suggestions that are already given for improving the attainment.
- The Program wise analysis and suggestions are presented in the respective Department Advisory Board (DAB) and Board of Studies (BoS). The members of these forums also give further suggestions.
- The institution wise review of CO attainment analysis is carried out by the Internal Quality Assurance Cell (IQAC). The level of attainment of COs are analyzed and IQAC provide further suggestions for improving the CO Attainment, based on the level of attainment.
- Suitable actions are initiated by the Programme coordinator based on the suggestions provided in the various forums for the improvement in the attainment of Course Outcomes.

Procedure for measuring the attainment of Course Outcomes for Theory Courses

The following are two components of examination for the courses and both components are considered for assessment:

1. Continuous Internal Examination (CIE)
2. Semester End Examination (SEE)

Continuous Internal Examination

Table 1 -CIE Assessment Tools

CIE Assessment Tools	
Direct Assessment Tools	<ul style="list-style-type: none"> ● Periodical Test ● Assignment / Seminar ● Project ● Presentation ● Case Study

CIE - Direct Assessment Tools and Procedure:

When other assessment tools are used in addition to the Periodical Tests, weightages could be fixed as per the following guidelines:

Table 2 CIE Assessment Tools and weightages

Assessment Tool	Weightage	Remarks	Formula
Common Assignment (CA)	20%	<ul style="list-style-type: none"> ➤ Common question can be given to all the students ➤ All the students must submit assignment 	$CIE_{Direct} = 0.8*PT + 0.2*CA$

Group Assignment (GA)	40%	<ul style="list-style-type: none"> ➤ Different questions should be given to different groups ➤ All the students must submit assignment 	$CIE_{Direct} = 0.6*PT + 0.4*GA$
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Assessment Tool	Weightage	Remarks	Formula
Case Study (CS)	50%	<ul style="list-style-type: none"> ➤ Case study may cover more than one CO. ➤ Students must be encouraged to give presentations in groups. ➤ Rubrics may be used for assessment 	$CIE_{Direct} = 0.5*PT + 0.5*CS$
Mini Project (MP)	50%	<ul style="list-style-type: none"> ➤ Students must do the projects by themselves either individually or in groups 	$CIE_{Direct} = 0.5*PT + 0.5*MP$
Quiz (QZ)	30%	<ul style="list-style-type: none"> ➤ Quiz may be conducted through Moodle 	$CIE_{Direct} = 0.7*PT + 0.3*QZ$
Seminar (SR)	40%	<ul style="list-style-type: none"> ➤ Rubrics may be used for assessment 	$CIE_{Direct} = 0.6*PT + 0.4*SR$

Procedure for Fixing Threshold in CIE- Direct Assessment:

- Threshold = Class Average $-(0.5 * \text{Standard Deviation})$
- If Class average is less than 50%, then Threshold is 50%
- If Class average is between 50% and 60%, then Threshold is the Class average
- If Class average is more than 60%, then Threshold is 60%

Attainment through CIE - Direct Assessment:

$$\text{CIE}_{\text{Direct}} = \% \text{ of students getting more than the threshold}$$

Semester End Examination (SEE) Tool: End Semester Examination

Procedure for Fixing Threshold in SEE - Direct Assessment:

$$\text{SEE}_{\text{Attainment}} = \% \text{ of students getting above the Threshold}$$

Overall Attainment: Course Outcome wise Attainment

Anna University and Autonomous Batches:

$$\text{CO}_{\text{Attainment}} = 0.5 * \text{CIE}_{\text{Attainment}} + 0.5 * \text{SEE}_{\text{Attainment}}$$

Target of CO Attainment	-	60%
Attainment Level I	-	60% to 69 %
Attainment Level II	-	70% to 79%

Attainment Level III - 80% and above

Procedure for measuring the attainment of Course Outcomes for Lab Courses

The following are two components of examination for the courses and both components are considered for assessment:

1. Continuous Internal Examination (CIE)
2. Semester End Examination (SEE)

1. Continuous Internal Examination (CIE)

CIE Assessment Tools

Direct Assessment Tools	<ul style="list-style-type: none"> ● Performance in Regular Lab Classes ● Model Exam
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Assessment Tool	Weightage	Formula
Model Exam (ME)	60%	$CIE_{Direct} = 0.6 * ME + 0.4 * PL$
Performance in Lab Classes (PL)	40%	

Procedure Attainment Assessment through Model Exam (Direct tool):

The attainment of students who have done experiments corresponding to the respective COs may be calculated.

CO	Experiments
CO 1	1, 3
CO 2	2, 4, 7
CO 3	5, 6, 8
CO 4	9, 10

Threshold percentage for Direct Assessment (Both Model Exam and Performance in Lab Classes)

- Average or 75 %

Attainment through CIE - Direct Assessment:

$$CIE_{Direct} = \% \text{ of students getting more than the threshold}$$

2. Semester End Examination (SEE)

Tool: End Semester Examination

Procedure for Fixing Threshold in SEE - Direct Assessment:

- Anna University Batches Threshold: 'B' Grade and above
- Autonomous Batches Threshold percentage
 - ❖ Threshold is 70%

Overall Attainment: Course Outcome wise Attainment

Anna University and Autonomous Batches:

Target of Attainment	-	70%
Attainment Level I	-	70% to 79%
Attainment Level II	-	80% to 89%
Attainment Level III	-	90% and above

Record the attainment of Course Outcomes of all courses with respect to set attainment levels

Program shall set Course Outcome attainment levels for all courses.

Measuring Course Outcomes attained through Semester End Examinations (SEE)

Target may be stated in terms of percentage of students getting equal or more than the target set by the Program in SEE for each CO.

Measuring CO attainment through Cumulative Internal Examinations (CIE)

Target may be stated in terms of percentage of students getting more than class average marks or set by the program in each of the associated COs in the assessment instruments (midterm tests, assignments, mini projects, reports and presentations etc. as mapped with the COs).

LEVEL OF ATTAINMENT FOR COURSE OUTCOMES

Level of Attainment	Theory Courses	Laboratory Courses
Level - I	60 - 69 %	70 -79 %
Level - II	70 – 79 %	80 – 89 %
Level - III	80 % and above	90 % and above
Not Met	Below 60%	Below 70%

Process for the assessment of attainment of Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

- The Programme Outcomes and Program Specific Outcomes are carefully mapped with Course Outcomes. The Course Outcomes are mapped with the Semester End Examination Questions.
- The attainment of Program Outcomes has two components i) Direct Assessment and ii)Indirect Assessment
- The direct assessment of the POs & PSOs is based on the attainment of the respective mapped course outcomes.
- The indirect assessment of the Program Outcomes consists of the Feedback from the graduating students, the achievements in the student portfolio, feedback from the Employer and the performance of the students in the competitive Exams.
- The assessment of attainment of POs & PSOs is carried out based on the performance of the students in the Direct Assessments and the Indirect Assessments.

- The Programme wise attainment analysis of POs & PSOs is carried out by the Programme Assessment Committee and suggestions are provided for improving the attainment.
- The Programme wise review of POs & PSOs attainment analysis is done by Department Advisory Board (DAB) and Board of Studies (BoS)
- The institute wise review of POs & PSOs is carried out by the Internal Quality Assurance Cell (IQAC). The level of attainment of POs & PSOs are analyzed and IQAC provide further suggestions for improving POs & PSOs Attainments, based on the level of attainment.
- Suitable actions are initiated by each Programme coordinator based on the suggestions provided in the various forums for the improvement in the attainment of POs & PSOs.

Procedure for measuring attainment of Program Outcomes (POs) and Program Specific Outcomes (PSOs)

The tools to be used for the assessment of attainment of Program Outcomes (POs) and Program Specific Outcomes (PSOs) are:

PO/PSO Assessment Tools	
Direct Assessment Tools	<ul style="list-style-type: none"> • Course Outcome Attainment
Indirect Assessment Tool	<ul style="list-style-type: none"> • Program Exit Survey • Employer Survey • Student Portfolio • Nationally - Normed Examination

Attainment of POs/PSOs through Direct Tools (PO_{Direct})

Direct Assessment of POs/ PSOs based on Course Outcome Attainment

$$PO_{Direct} = PO_{CO}$$

Tool: Course Outcomes

Attainment through CO Attainment, (PO_{CO})

$$PO_{co} = \sum \frac{\% \text{ of CO Attainment } \times \text{ Correlation Level of CO \& PO Mapping}}{\text{Sum of the Correlation Levels}}$$

where the Correlation Levels are:

3 - Strong Correlation 2 - Medium Correlation 1 - Weak Correlation

Attainment of POs/PSOs through Indirect Tools ($PO_{Indirect}$)

S. No.	Name of the Indirect Tool	Weightage
1.	Student Portfolio & Nationally - Normed Exams	10%
2.	Exit Survey	50%
3.	Employer Survey	40%

$$PO_{Indirect} = 0.1 * PO_{Portfolio} + 0.5 * PO_{Exit Survey} + 0.4 * PO_{Employer Survey}$$

Overall Attainment: POs & PSOs

$$PO_{Attainment} = 0.8 * PO_{Direct} + 0.2 * PO_{Indirect}$$

Attainment levels for POs and PSOs are fixed as follows

\geq Target & $<$ Target+3	I
\geq Target+3 & $<$ Target +6	II
\geq Target+6	III
Percentage Range	Attainment Level
$<$ Target	Not Met



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