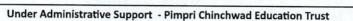


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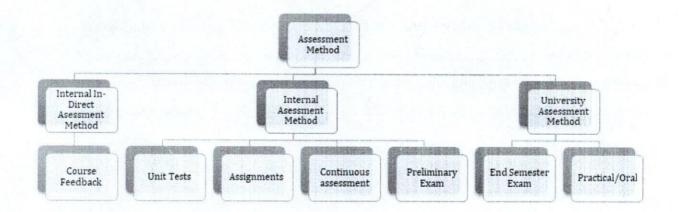
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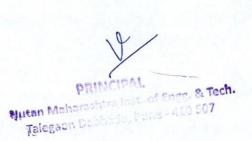
"Samarth Vidya Sankul", Vishnupuri, Telegaon Dabhade, Taluka Maval, District Pune - 410507 Tel. No. 02114 – 231666, E-mail :nmiettalegaon@gmail.com Web : www.nmiet.edu.in

PROCESS OF CO ATTAINMENT

Assessment Tools

During the curriculum design process, each course is assigned with engaging hours, assessment methods and marks and credits. Assessment methods are the strategies, techniques, tools, and instruments for collecting information to determine the extent to which students demonstrate desired learning outcomes.







The assessment process of COs is divided into two parts:

a) Internal Assessment

- Direct Method (80%)
- Indirect Method (20% of Course Feedback)

b) External Assessment

Twenty percentage (20%) weightage is given to Internal Assessment and Eighty percentage (80%) weightage is given to External Assessment.

The Internal Assessment tools such as Unit Tests, Preliminary Examination, Assignment etc. are used at the Department level as per the Institute academic calendar and the External Assessment is done at the university level.

The assessment processes used to gather the data upon which the Evaluation of Course Outcome is based are as follows:

Sr. No.	Assessment Method	Description
1	Unit Test	All the theory courses in the curriculum have unit test as one of the assessment tools. The maximum marks allocated to this tool are 25 marks for FE and SE and 30 Marks for TE and BE. In a semester Two Unit Tests for FE and SE and one Unit test for TE and BE are conducted. All the courses have total 6 units/modules. First unit test covers the first two units and unit test two covers from 3 rd and 4 th unit from the curriculum for FE and SE students and for TE and BE student's unit test one covers first three units. Questions from the units are asked in the unit tests. Unit tests helps in assessing the student's knowledge, understanding and use of knowledge which inturn helps to calculate the course attainment. Marks obtained from the Unit Tests are considered as the final marks out of 25 and 30 that contribute to the Internal assessment.





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2	Assignments	The class assignments are given to students by the respective course coordinators. Assignments carry a maximum mark of 10 marks. The assignments are normally in the form of questions which requires students to do some research, solve problems, prepare case studies, make, and use presentations, use tools etc. The assignments help in assessing the extent to which student possess course knowledge, its understanding, applying the knowledge, use of tools, analyzing capability, etc. It is expected that there should be minimum one assignment given on each unit. The average of earned mark in all the class assignments is calculated. This contributes to the Internal assessment.
3	Continuous assessment	All the courses that are having practical engaging mode will be assessed using term-work & practical or term-work and oral. The practical or oral assessment is done at the end of semester and is not continuous in nature. The term-work is a continuous assessment method wherein the students are evaluated in the practical knowledge of the respective courses right from the beginning of the semester till end. In the practical session during the semester, the students will be given laboratory exercises. The laboratory exercises include the activity of writing algorithms, designing the systems, analyzing the problems, using variety of tools to create, and run programs and technical report writing. The assessment of these laboratory exercises helps in assessing the student's creativity, evaluation, analyzing skills. The term-work is having maximum marks of 25 and 50 marks. The parameters used to assess the term-work are Date of Checking, Presentation, Performance, and Understanding shown for executing the practical laboratory exercises.
4	Preliminary Examination	Preliminary Exam is based on all units of the syllabus for the respective subjects of 70 marks for TE and BE, and 50 marks for SE. The course teacher prepares questions paper according to learning levels for the respective course, considering COs to be assessed through internal examinations. The course teachers evaluate the answer sheets and discuss solutions with





		students. The course teacher does the result analysis and
	8	calculates CO attainment.
5	Course Feedback	Course Feedback is based on all units of the syllabus for the respective subjects on the scale of 5 points for all the courses. The feedback coordinator / Course Coordinator prepares questions according to COs for the respective course, considering COs to be assessed through indirect process.

ExternalAssessmentTools:

Sr. No.	Assessment Method Description	
1	End Sem Exam	End-Sem exam is conducted as per the schedule given by SPPU. The end SEM exam for FE and SE is for 50 marks whereas the end semester examination for TE and BE is for 70 marks.
2	Practical and Oral	Practical and Oral exams are conducted as per the schedule given by SPPU. The practical and oral exam is conducted according to the curriculum.

3.2.2 RecordtheattainmentofCourseOutcomesofallcourseswithrespecttosetattainm entlevels(40)

Measuring CO attainment through Internal Assessments:

Attainmentlevelofeachassessmenttoolhasbeendeterminedbycategorizingtotalnoofstudents into 3 levels according to their performance in each assessment.

COs Attainment Process

Step 1: Define the level of Attainment Rubrics. 3 levels of attainment have been defined:

Level 1: 50% students scoring more than set target marks

Level 2: 60% students scoring more than set target marks

Level 3: 70% students scoring more than set target marks

The set target mark is the average performance of the class.

AttainmentLevel: AttainmentLeveliscalculated as below:

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AttainmentLevel=	SumoflevelobtainedbyeachstudentforeachCO
	TotalStudent

TableB.3.2.2.a Attainmentlevel

Criterion	(AssessmentTool) COi	
Rangeof Marks	No.of StudentsforCO _i	Attainment
Marks>=70%	Xi	$=(X_i*3)+(Y_i*2)+(Z_i*1)$
60 to 69.99%	Yi	TotalNo of Students
50 to 59.99%	Zi	TotalNo.of Students
Marks<50% (failed)+Absent	F	0

CO:InternalAttainmentLevel=	SumofAttainmentlevelofallInternalassessmenttools
	No.ofassessmenttools
CO:ExternalAttainmentLevel=	SumofAttainmentlevelofall Externalassessment tools
	No.ofassessmenttools

 $CO_i Course Attainment = (0.2*CO_i Internal Attainment level + 0.8*CO_i External Attainment level)$





	Question wise marks scored by each student in each assessment tools will be used to
	calculate the total marks obtained by the student in each COs. This is calculated by
	summing the scored marks of those questions which are mapped to the respective
	COs.
	For example, If, question1, question 3 is mapped to CO 1, consider the marks
	scored by the student in both question and add them. That mark will be considered
Step 2	for the CO 1 attainment calculation.
•	
	Similarly, repeat the same step for all students and for all assessment tools.
	Count how many students in the class have scored more than equal to set target for
	each COs in each assessment tools. Calculate the percentage of students attained the
	set target. Compare it with percentage defined in level of attainment rubrics and
	assign the equivalent level for the respective COs.
Step 3	Defining the Weightages of the Assessment Tools.
	In order to calculate the CO attainment, Consider the level attained by COs in each
	assessment tool. Use the weightage of the respective assessment tool as multiplying
Step 4	factor to calculate the contribution to the respective COs by the assessment tools.
•	Calculate the summation of the contribution by the assessment tool to the respective
	COs.







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PROCESS OF PO ATTAINMENT

Assessment process of POs/PSOs is divided into two parts: Direct Assessment and Indirect Assessment. Direct Assessment includes the assessment of each CO contributing towards attainment of PO and Indirect Assessment includes views of stakeholders correlated to the PO/PSO attainment. Eighty percentage (80%) weightage is given to Direct Assessment and twenty percentages (20%) weightage is given to Indirect assessment. Direct Assessment is further divided in two parts viz. Internal Assessment & External Assessment. The internal Assessment tools such as Unit Tests, Preliminary Examination, Assignments, Continues Assessment, etc. is done at the Department level as per Institute academic calendar and the External Assessment is done at University level. The Indirect Assessment tools include Exit Survey, Alumni Survey, Employer Surveys, and Project Examiner Feedback.

Figure B.3.3.1.a provides the PO & PSO Attainment process and tools. Internal and External Assessment tools are as shown in the Table B.3.3.1.a and Table B.3.3.1.b

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Direct Assessment:

Calculation of attainment of PO or PSO through Direct Assessment:

PO or PSO_j Attainment =
$$\frac{\sum_{i} \text{Attainment of COi} * \text{Mapping of COi to POj or PSOj}}{3 * \text{No. of CO Mapped to POj or PSOj}}$$

Where i vary from 1 to number of COs and j varies from 1 to 12 for PO and 1 to 2 for PSO

Indirect Assessment:

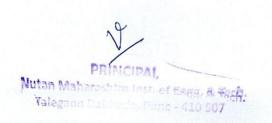
	[Survey1AttainmentforPOorPSO _i +Survey2AttainmentforPO
POorPSO;Attainment=	OrPSO _i +]
	TotalNo.ofSurveyMappedtoPO orPSO;

Where i varies from 1 to 12 for PO and 1 to 2 for PSO

Survey PO or PSO_i Attainment =
$$\sum_{i=1}^{n} Student Grade 3$$

$$\frac{\sum_{i=1}^{n} Student Grade}{n} \frac{3}{Max Grade for Survey}$$

Where n= Total no. of Student





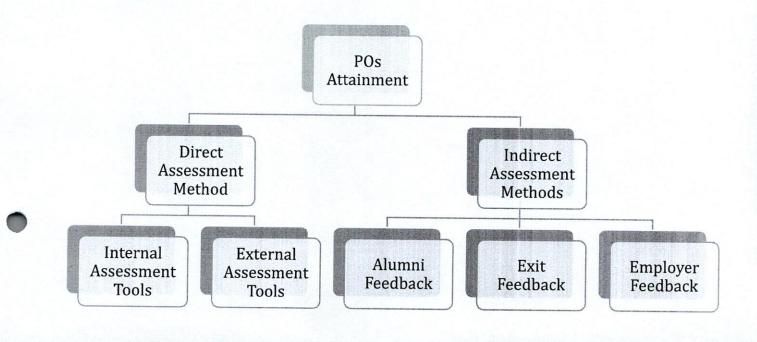


Figure 3.3.1.1



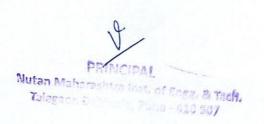


TableB.3.3.1. a Assessment tools for Program Outcomes
(Direct Assessment)

Sr. No	Examination	Schedule
Direct At	tainment methods	
		1. Internal Assessment
01	Unit Test	After completion of Two/Three unit.
02	Preliminary Exam	End of the Semester
03	Assignments	After completion of One unit.
04	Continues Assessment	After Every Practical
		2.External Assessment
01	End Semester Exams	End Semester
02	Practical and Oral	End Semester

TableB.3.3.1.b Assessment tools for Program Outcomes (Indirect Assessment)

Sr. No	Assessment tool	Assessment criteria
01	Exit Survey	To evaluate the success of program in providing students with opportunities to achieve the program outcome
02	Alumni Survey	Quantitative data of demonstration of various abilities in profession.
03	Employer Survey	Number of Graduates fulfils the employer's expectations







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DIRECT & IN-DIRECT ASSESMENT METHODS TO SHOW ATTAINMENT

Assessment process of POs/PSOs is divided into two parts: Direct Assessment and Indirect Assessment. Direct Assessment includes the assessment of each CO contributing towards attainment of PO and Indirect Assessment includes views of stakeholders correlated to the PO/PSO attainment. Eighty percentage (80%) weightage is given to Direct Assessment and twenty percentages (20%) weightage is given to Indirect assessment. Direct Assessment is further divided in two parts viz. Internal Assessment & External Assessment. The internal Assessment tools such as Unit Tests, Preliminary Examination, Assignments, Continues Assessment, etc. is done at the Department level as per Institute academic calendar and the External Assessment is done at University level. The Indirect Assessment tools include Exit Survey, Alumni Survey, Employer Surveys, and Project Examiner Feedback.

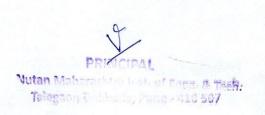
Figure 3.3.1 provides the PO & PSO Attainment process and tools. Internal and External Assessment tools are as shown in the Table .3.3.1.1 and Table 3.3.1.2

Direct Assessment:

Calculation of attainment of PO or PSO through Direct Assessment:

PO or PSO₃ Attainment = $\frac{\sum_{i} \text{Attainment of COi} * \text{Mapping of COi to POj or PSOj}}{3 * \text{No. of CO Mapped to POj or PSOj}}$

Where i vary from 1 to number of COs and j varies from 1 to 12 for PO and 1 to 2 for PSO



Indirect Assessment:

	[Survey1 Attainment for PO or PSO +Survey2 Attainment for
PO or PSO Attainment =	PO Or PSO +]
	Total No. of Survey Mapped to PO or PSO _i

Where i varies from 1 to 12 for PO and 1 to 2 for PSO

Survey PO or PSO_i Attainment =
$$\frac{\sum_{i=1}^{n} Student Grade}{n} = \frac{3}{Max Grade for Survey}$$

Where n= Total no. of Student

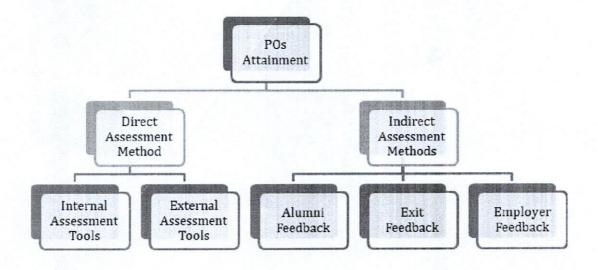


Figure 3.3.1.1





Table 3.3.1.1 Assessment tools for Program Outcomes (Direct Assessment)

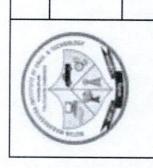
Sr. No	Examination	Schedule
Direct Att	ainment Methods	
		1. InternalAssessment
01	Unit Test	After completion of Two/Three unit.
02	Preliminary Exam	End of the Semester
03	Assignments	After completion of One unit.
04	Continues Assessment	After Every Practical
		2.External Assessment
01	End Semester Exams	End Semester
02	Practical and Oral	End Semester

Table 3.3.1.2 Assessment tools for Program Outcomes (Indirect Assessment)

Sr. No	Assessment tool	Assessment Criteria
01	Exit Survey	To evaluate the success of program in providing students with opportunities to achieve the program outcome
02	Alumni Survey	Quantitative data of demonstration of various abilities in profession.
03	Employer Survey	Number of Graduates fulfils the employer's expectations







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INDIRECT ATTAINMENT BASED PO ATTAINMENT

1) Surveys and its correlation with POs 2) Alumni Survey and its Mapping with POs & PSOs

Table 3.3.2.4: Alumni Survey and its Correlation with POs

Questionnaires (Alumni Survey)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 01	PO 11	PO 12	PSO 1	PSO 2
Have you been trained to apply knowledge of E&TC and technology to analyze, design and simulate to provide optimized solutions for Complex Problems? Rate yourself based on your ability and confidence:	7	7	~	7	7							>	7 /	7
Have you been taught and motivated to Enhance skills and adapt new \ computing	>	>	٨	7	> "	(3)	7					>	>	7

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technologies and contribute to research & development either through research or by practice. Rate yourself based on your ability and confidence:	Do you Engage in Professional and ethical practices in multidisciplinary working environment?	Have you been trained to apply fundamental knowledge and technical skills towards solving Engineering problems? Rate yourself based on your ability and confidence:	Do you employ expertise and ethical practice through continuing intellectual growth and adapting to the working environment?	Do you agree that you have understanding of the theory and practices of fundamental principles of E&TC engineering?	Do you agree that the program has enabled you to practice keep learning and work in team	To what extent you agree that the program enabled you to experience of observing, learning, analyzing and solving the real world problems?

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program enabled you to confidently work on various opportunities for investigation, research, development and building innovative solutions for E&TC engineering complex problems?			7	7								7	7	7
To what extent you agree that program has prepared students for taking up industrial jobs or for higher education	and the second s											>	7	7
To what extent program has enabled you to apply ethical principles, engineering principles while building solutions for betterment of society and environment.							7	>	>					7
Have you published any research / technical paper after graduation?	7									>		>	>	7
Are you involved in any research?	>	7	7	>	>	>	7			7		>	>	7
Have you attended any seminars / workshops after graduation?	7							>				7	>	7
Have you acquired any additional educational qualification after graduation?	· ·							,				7	7	7
Have you received any award / recognition in your professional career?		5			The second second second	o de la companya della companya della companya de la companya della companya dell		60g. 8	>	7	>			7

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EXIT SURVEY AND ITS MAPPING WITH POS & PSOS

Table 3.3.2.5: Exit Survey and its Correlation with POs

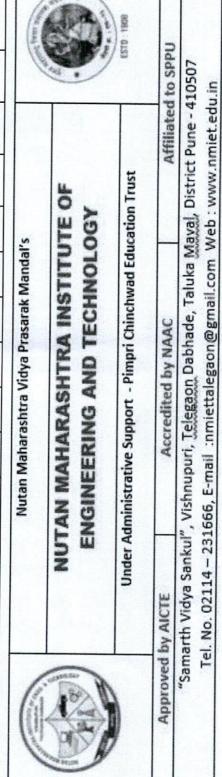
Questionnaires (Exit Survey)		PO PO 1 2	PO 3	PO 4	PO 5	Od 9	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
How confident are you in your current ability to Use mathematics to describe and solve engineering problems?	7	7		>									7	7
How confident are you in your current ability to Apply your engineering knowledge and skills to solve a real-world problem?		> 2	7	>		>	10						7	7

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current ability to Synthesize information to reach conclusions that are supported by data and needs?		7	>									>	>
How confident are you in your current ability to Analyze and interpret data?	7		>									>	
How confident are you in your current ability to Analyze the trade-offs between alternative design approaches and select the one that is best for your project.		7	7	>								7	
How confident are you in your current ability to Describe the limitations of various engineering tools and choose the best one to accomplish a task.				7							7	7	7
How confident are you in your current ability to Review your team's strengths and weaknesses and tell others where the team might need help.					7		>	7		~			7
How confident are you in your current ability to Use various written styles and formal presentation to communicate complex engineering concepts to your colleagues.	-					\ \formall \ \formall \ \ \formall \ \ \formall \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	7 (8		7		7	7	7

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How confident are you in your current ability to Identify the interactions that an engineering project has with the economic, social, health, safety, legal, and cultural aspects of society			>	7	7	7	7	7	7		7	
Did the Graduation course taught you Valuable skills?	>	>			>				٨	7	>	
						The second						



EMPLOYER SURVEY AND ITS MAPPING WITH POS & PSOS

Table 3.3.2.5: Employer Survey and its Correlation with POs

Alumni demonstrate $\sqrt{\frac{1}{2}}$	9 2	P0 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Alumni demonstrate $\sqrt{\frac{1}{\lambda}}$									
Independence of technology, of			1						
mediation got recimology of	>	>	100	,				>	>
the industry/discipline			9						

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	t extent you agree that demonstrate Analytical, and system development	To went extent you believe that aluming shows attitude towards efficiency for the state of the s	Humini extent you believe that Humini exhibit good stephing/Hiestioning and learning happabilities:	文字 文字 文字 文字 文字 文字 文字 文字 文字 文字 文字 文字 文字 文	Restent you believe alumni	Attitude E for Solving Stroplems alecision making	the Aumni exhibit ability to work in a group with good team behavior and compatibility?	Flo what extent you agree that Alumini exhibit Professional & Ethiore Behavior (Ethics & Value)	Do dalumni demonstrate time management skills	7
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alumni is of the highest quality and $\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{$	Do vou believe the Work done by														
appropriate volume	alumni is of the highest quality and	>	>	>	>	>	>	>	7	>	7	7	7	>	7
	appropriate volume													•	>

Attainment of the POs and PSOs through indirect attainment is based on the following attainment level defined:

Level-3: 80% or above survey takers giving 4 or 5 marks

Level-2: 70% or above survey takers giving 4 or 5 marks

Level-1: 60% or above survey takers giving 4 or 5 marks



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