

### ***2.6.2 Attainment of POs and COs are evaluated by the Institution***

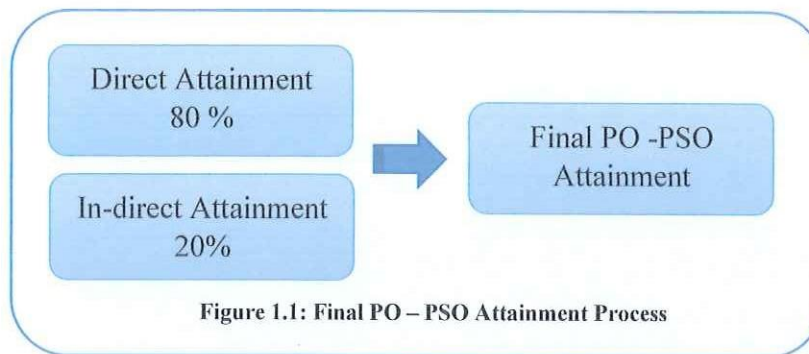
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### 1. Process of CO-PO PSO Attainment

The CO and PO attainment calculation process starts with CO attainment calculation and the CO attainment values are used for PO calculation. The Final PO – PSO attainment is derived from Direct Attainment and In-direct Attainment. Direct Attainment is given 80% weightage and 20% weightage is given for In-direct attainment.

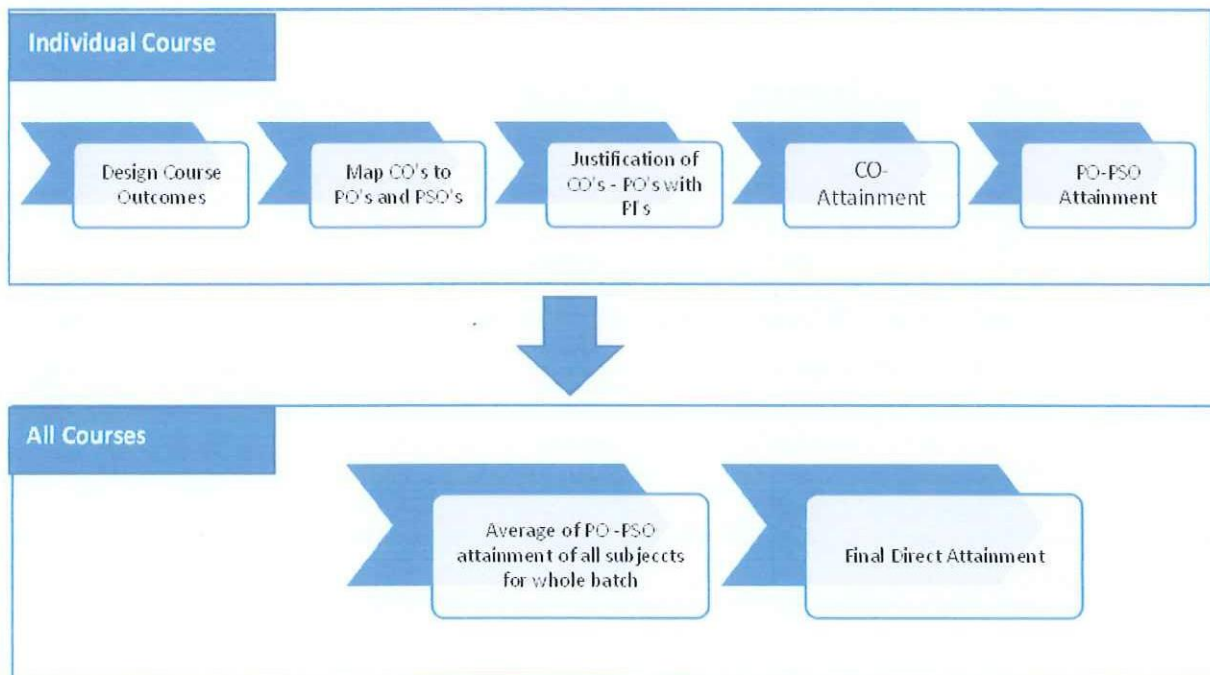


  
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### 1.1 Direct Attainment

The process of Direct attainment comprises of the following steps

- **Individual Subjects**
  - Design Course Outcomes
  - Mapping of CO's to PO's and PSO's
  - Justification of CO's to PO's with reference using Program Indicators
  - CO Attainment
  - CO-PO PSO Attainment
- **All Subjects (First Year to Final Year)**
  - Average of all PO PSO Attainment ( For Batch)
  - Final Direct Attainment



**Figure 1.1.1 Process of Direct Attainment**



  
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### 1.1.1 Design Course Outcomes:

Course outcomes are designed for each and every subject of the batch with respect to Blooms Taxonomy. A sample table for Course Outcomes is shown below.

Course Code	Course Outcomes
CSC 303.1	Students will be able to implement Linear and Non-Linear data structures.
CSC 303.2	Students will be able to handle various operations like searching, insertion, deletion and traversals on various data structures.
CSC 303.3	Students will be able to explain various data structures, related terminologies and its types.
CSC 303.4	Students will be able to choose appropriate data structure and apply it to solve problems in various domains.
CSC 303.5	Students will be able to analyze and implement appropriate searching techniques for a given problem.
CSC 303.6	Students will be able to demonstrate the ability to analyze, design, apply and use data structures to solve engineering problems and evaluate their solutions.

Table 1.1.1.1

### 1.1.2 Mapping of CO's , PO's and PSO's

The designed Course Outcomes are mapped to Program Outcomes and Program Specific Outcomes in the range of 1 – 3, sample table is shown below. ( 1- Low, 2- Medium, 3- High)

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO 1	3		2		2	2							3	
CO 2	3	3											3	
CO 3	3	2		1	2	2								
CO 4	3	3			2								3	
CO 5	3	3	2		2	2	3						3	
CO 6	3	3	3	3	2	2					2	3	3	
Avg	3	3	2	2	2	2	3				2	3	3	

Table 1.1.2.1: Correlation

### 1.1.3 The justification of POs, PSO's to COs correlation mapping

The PO's mapped for each CO are justified and mapped with the Program Indicator's as listed in Exam Reforms.



  
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Course Title/Code	Course Outcome	PI	Justification
CSC305.1	Student should be able to implement Linear and Non-Linear data structures	1.7.1, 3.8.2, 5.5.2, 6.4.1	PO1:High: Students are applying the knowledge of various data structures PO3: Moderate: Focus on implementing the programs by defining functionalities. PO5: Moderate: using various IDE (TurboC,Dev C).  PO6: Make use of ANCI and ASCII standards to write programs

**Table 1.1.3.1: CO -PO Justification with PI's**

#### 1.1.4 CO – PO PSO Attainment

The CO attainment calculation follows the following steps:

- Threshold Setting:** Threshold is set based on the targets to be achieved and previous results.

Level	Internal Level Description for above subject			External Level description		
0	No student scoring			% and above in the question in Test/Tutorial/Assignment/Quiz	No of Stud	Last 2 years Average university Results
1	60	% students scoring	60	% and above in the question in Test/Tutorial/Assignment/Quiz	60	60
2	70	% students scoring	70	% and above in the question in Test/Tutorial/Assignment/Quiz	70	70
3	80	% students scoring	80	% and above in the question in Test/Tutorial/Assignment/Quiz	80	80

**Figure 1.4.1: Threshold Setting**

Threshold is set for Internal Exams and External Exams separately. In the above sample Internal Threshold is set as 60, 70, 80 and External threshold is set as 60, 70, 80.

- If CO has achieved > 80% then attainment Level is 3
- If CO has achieved 71 – 80% then attainment Level is 2
- If CO has achieved 61 – 70% then attainment level is 1

60	% marks /question	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
60	% &above obtained count	105	107	105	96	102	85	94	97
	Attainment Level in %	98	100	98	90	95	79	88	91
	Attainment Level	3	3	3	3	3	3	3	3
	No of students not attempted the question	0	0	0	0	0	0	0	0

**Table: 1.1.4.1 Sample Attainment level Calculation with threshold**



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**Formula:**

Attainment	Formula
60 % marks /question	$60/100 = 0.6$ ( 60 is the Level 1 threshold value)
60 % &above obtained count	Count of students having >60%
Attainment Level in %	(Count of students having >60%) / (Total no of students – Total no of students not attempted the question)
Attainment Level	3 or 2 or 1 according to the attainment level %
No of students not attempted the question	Total no of students who did not attempt the question

**Table : 1.1.4.2 Formula for Attainment level calculation**

**b. Data Collection:** Data is collected from Internal and External Assessments

➤ **Internal Assessment**

- Unit Test
- Term Work
- Assignment
- Laboratory Experiments
- Mini Projects

➤ **External Assessment**

- Term End Exam
- Oral Practical Exam
- Projects

**c. CO Attainment:** The weightage for the collected data is as follows

- 20% weightage for Internal Assessment
- 80% weightage for External Assessment

Formula for CO1	Internal Assessment (X)	External Assessment (Y)
	X= Sum (ALL CO's attainment level value mapped to 1)/ (total no of CO's mapped to 1)	Y= 0.2 % (X) + 0.8% (External CO attainment Value)
CO1	3	3

**Table 1.1.4.3: Sample CO -Attainment**

**d. PO - PSO Attainment:** PO -PSO attainment we have weighted Average and Scaled Average / Threshold Average. Weighted is used to check for individual subject and Scaled is used for taking an average of all the subjects of the batch.



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**Weighted Average:** This is the PO attainment value mapped according to the level of correlation value

- If the correlation value is set to **3** the same value of CO- attainment is mapped to PO attainment.
- If the correlation value is **2** then only **67 %** of co-attainment value is mapped to the PO attainment.
- If the correlation value is **1** then only **33%** of CO attainment value is mapped to the PO attainment.

According to table shown below

- **CO1 – PO1** correlation is High (3) . Therefore the same value of CO attainment is mapped to CO1 – PO1 attainment table.
- **CO1 – PO3** the correlation is Low (1). Therefore only 33% of CO attainment value is mapped to CO1 – PO3 attainment table.

**Calculation : CO attainment value (Y) for CO1 from table 1.4.1 is 3 , but correlation is 1 therefore  $0.33 * 3 = 1$**

- **CO1 – PO5** correlation is Medium (2). Therefore only 67% of CO attainment value is mapped to CO1 – PO 5 attainment value.

**Calculation: CO attainment value (Y) for CO1 from table 1.4.1 is 3, but correlation is 2 therefore  $0.67 * 3 = 2$**

Finally Average of PO1 – PO12 and PSOs are taken for all the CO's to get Average PO PSO attainment values.

**Threshold / Scaled Average:** This is the PO attainment value mapped according to the scaled value which will be useful in taking average PO attainment of all subjects.

- If the correlation value is set to **3 or 2 or 1** the same value of CO- attainment is mapped to PO attainment, because the co attainment value is scaled according to the threshold set.

According to table shown below

- **CO1 – PO1** correlation is High (3).The same value of CO attainment is mapped to CO1 – PO1 attainment table.
- **CO1 – PO3** the correlation is Low (1). The same value of CO attainment is mapped to CO1 – PO3 attainment table.



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- **CO1 – PO5** correlation is Medium (2). The same value of CO attainment is mapped to CO1 – PO5 attainment table.

Finally Average of PO1 – PO12 and PSOs are taken for all the CO's to get Average PO PSO attainment values.

Correlation table														
	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2
CO1	3	3	1		2									
Attainment Table														
CO1	3	3	1		2									
Weighted Formula for CO1 – PO1				<ul style="list-style-type: none"><li>• If correlation value = 3 then External CO- Attainment value (Y)</li><li>• If correlation value =2 then 0.67 * External CO- Attainment value (Y)</li><li>• If correlation value =2 then 0.33 * External CO- Attainment value (Y)</li></ul>										
Weighted CO1- CO6				Average of all CO's										
Threshold / Scaled Formula for CO1 – PO1				==value (External Attainment Value (Y) )										
Threshold / Scaled CO1 – CO6				Average of all CO's										
Note: Y value taken from table 1.1.4.3														

**Table 1.1.4.4: Sample PO Attainment table with Formula**

### 1.1.5 PO PSO Attainment (All Subjects)

PO Attainment is collected from all the subjects and an average is taken for the whole Batch.

Subject	PO 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	P S O 1	P S O 2
Sub 1														
Sub 2														
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Sub n														
Average														

**Table 1.1.5.1 Average PO PSO Attainment Calculation**

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#### 1.1.6 Final Direct Attainment:

The average PO attainment is taken and 80% of Average PO attainment is considered for final direct attainment

Subject	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	P S O 1	P S O 2
Sub 1														
Sub 2														
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Sub n														
Average														
Direct Attainment	80% of Average PO PSO Attainment													

Table 1.1.6.1 Final Direct Attainment Calculation

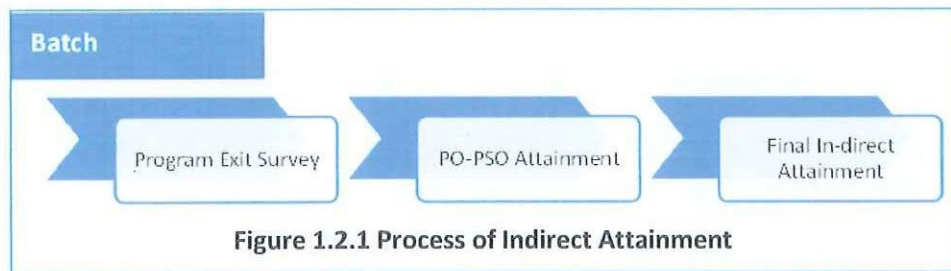


  
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## 1.2 Indirect Attainment

The Indirect attainment is obtained by following steps:

- **Individual Subjects**
  - Take a Course Exit Survey
  - Calculate CO attainment
  - Calculate CO-PO PSO Attainment
- **All Subjects (First Year to Final Year)**
  - Average of all PO PSO Attainment (For Batch)
  - Final In-direct Attainment



### 1.2.1 Program Exit Survey:

A survey is taken from students to check whether they are able to achieve the Program outcomes for the whole course. The survey is taken at the end of the semester as self-assessment by rating the questions based on PO's by rating between ( 1-5 ).

### 1.2.2 PO – PSO Attainment:

Average ratings of all CO's are taken and they are between 1-3.

Average of CO's	Scaled value
5-4	3
3-2	2
1	1

**Table 1.2.2.1: CO-Attainment Scaling**

The responses are summed upon the total number of responses of the students. The average value will be between 1 to 5. The average value is scaled between 1 to 3 as shown below. The Scaling ratio is taken from the above table 2.2.1.



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Students	PO 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	P S O 1	P S O 2
Student 1														
Student 2														
:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Student n														
Average														

Table 1.2.2.1 Average PO PSO Attainment Calculation

Students	PO 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	P S O 1	P S O 2
Average	5	5	4	4	3	3	2	2	1	1	4	4	5	5
Scaled	3	3	3	3	2	2	2	2	1	1	3	3	3	3

Table 1.2.2.2 Average PO PSO Attainment Calculation

### 1.2.3 Final In-direct Attainment:

The average PO attainment is taken and 20% of Average PO attainment is considered for final direct attainment

Subject	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	P S O 1	P S O 2
Average														
In-direct Attainment	20% of Average PO PSO Attainment													

Table 1.2.3.1 Final In-direct Attainment Calculation

## 2. Final Attainment:

The final attainment is given 80% weightage for Direct Attainment and 20% weightage for In-direct Attainment.

Attainment	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	P S O 1	P S O 2
80% (Avg Direct Attainment)														
20% (Avg In-direct Attainment)														
Average	Final Attainment													

Table 2.1 Final Attainment Calculation



### 3. Sample Sheet (CSC305 Data Structures)

#### 3.1 Threshold set

Attainment Levels for			
Level	Level Description for above subject		
0	No student scoring	60	% and above in the question in Test/Tutorial/Assignment/Quiz
1	50 % students scoring		% and above in the question in Test/Tutorial/Assignment/Quiz
2	60 % students scoring		% and above in the question in Test/Tutorial/Assignment/Quiz
3	70 % students scoring		% and above in the question in Test/Tutorial/Assignment/Quiz

#### 3.2 Data collection and CO-PO attainment calculation

Name of the Subject	DS (CSC305)										Nos. of Students											
SEM – YEAR		III - 2019-20										103										
		UT1										UT2										TEP
Question No.		1a	1b	1c	1d	1e	1f	2a	2b	3a	3b	1a	1b	1c	1d	1e	1f	2a	2b	3a	3b	
Total Marks/question		2	2	2	2	2	2	5	5	5	5	2	2	2	2	2	2	5	5	5	5	80
Map to CO		3	1	2	1	5	1	1	3	3	3	1	2	2	3	3	1	2	3	3	3	
BABU SATIS	117A1067				1				5	2			1	2	2	2	1	4				40
MURLI SHA	117A1073	2	1	2	2		2	4		4		2	2	2	2	2	2	2		3		52
AANSH SAG	118A1001	2	2	2	1	2	2		5	5		2		2	2	2	2	5		5		70
ABIRAM SU	118A1002	1	2	2		2	2		5	1	3	2		2	2	2	2		4	4		41
ADITYA SAD	118A1003	1	2		1	2	2		3		2	2		2	2	2	2	5	3		5	54
AKASHSAI R	118A1005	2	1	2	2	2	2	3		3	3	2	2	2	2	2	2	5		4		63
AKHIL MAN	118A1006		2		3	2			1			2		2		2	1					32
AKSHITA K	118A1007	2		2	2	2	2		5	5		2	1		2	2	2	4			5	42
ASHWATH S	118A1008	1	2	2		2	2		5	2		2		2	2	2	2	2		2		45
AYER MANS	118A1009		2		2	2			5				2	2	2	2	1		4		1	34
BASRI ZAID	118A1010		2	2	1	2		1				2		2		2	2	1	4		5	41
BATIBROLU	118A1011	1	1	2	2	2	2			2		1		2	2	2	2		3			51
BELWADI A	118A1012	1	3	2	2	2	2			3		2	1	2	2	2	1	1	5	5		61
BHANDARI	118A1013		1	2		2	2		1			2	1		1	2	1	1	1		1	40
SNEHA SATI	118A1014	2	2	2	2				5	2		1		2	2	2	1	5		4		57
RUCHI RAM	118A1015	2		2	1	2	1		2	2		2	2	2	2	2	2	5	1	1		46
ADITYA BOI	118A1016	2	2		2	2	2		5	5		2		2	2	2	2	5	5	5		61
BUBERE ZAI	118A1017	2		2	2	2			5	2		2		2	2	2	2	2		2	5	66
C R ABUBAK	118A1018	2	2	2	2	2	2	4		1		2		2	2	2	2	5		5		70
CHOUDHAR	118A1019	2	2	2	2		2	4		2		2		2	2	2	2	5	4	5		70



DARSHAN C	118A1020	2	2	2	2		2	2		5		2	1	2	1	2	2		4	58		
DIVHYA GN	118A1021	1		2	1	2	2	3		5		2	1	2	2	2	2	5	4	64		
GAIKWAD V	118A1022	2	1	2	2	2		1		5		2		2	2	2	2	3	1	62		
GANESH GA	118A1023	1		2	2		2			2		2		2	2	2	2	5	4	55		
GOYAL HAR	118A1025	2		2		2	2	1		1		2	1		2	2	2		4	5	42	
IYER ANIRU	118A1026		1		1	2	2			2		2		2	2		2		4		22	
IYER KARTH	118A1027	2	2	2		2		4		5		2		2	2	2	1		5	1	46	
IYER SARAV	118A1028		1	2	2	2	2	2				1	1	2	2	2	2		1	1	45	
IYER VINEET	118A1029	1		2	1	1	2	2		1		2	2		2		1	2		4	34	
JOSHI ABHI	118A1030	2	2	2	2	2	2		4	5		2	1	2	2	2	2	5		3	53	
K SANDHIYA	118A1031	1		2	1			2		4		2	1	2	2	2	2	1		1	4	49
KRITI KAKKA	118A1032	1		2		2	1		5	5		2	2	2	2	2	2	1	2		4	45
KODETHUR	118A1033	2	1	2		2	2	4				2	1	2	2	1		5			52	
KOLHE ANU	118A1034	2	2	2	2	2		4		4		2	1	2	2	2	2		5	4	5	51
KONAR USH	118A1035	1		2	1	2			2	3		2	1	2	2	2	2	1		3	5	51
KSHIRSAGA	118A1036	2		2	2	2	2	4		5		2	1	2	2	2	2		5	5		61
KULKARNI D	118A1037	1	1		2	2		3		1		2	2	2	2	2	2	5		1		43
KULKARNI S	118A1038	2	2	1	2	2	2	5		5		2	2	2	2	2	2	5		5		65
LAKSHMI SU	118A1039	2		2	1	1			1	4		2	2	2	2		1		4	1		49
LOYA SHUB	118A1040	2		2	2	2	1	1		2		2		2	2	2	1		4		5	45
M ADITHYA	118A1041		2	2	2	2	1	2		5		2		2	2	2	1	5		5		52
SAKSHI NITI	118A1042			1	2							2	1	2	2	2	2	5	3	3	3	38
MAHITHAS	118A1043	1		2	2		2	3		1	3	2	1	2	2	2	2	2	3	3	4	59

% marks 60 /question	1.2	1.2	1.2	1.2	1.2	1.2	3	3	3	3	1.2	1.2	1.2	1.2	1.2	1.2	3	3	3	3	40
% &above 60 obtained by Nos.	48	44	76	46	64	58	33	24	48	8	82	24	92	77	90	48	32	36	32	34	75
Attainment	71	75	95	78	102	92	66	92	71	133	88	49	108	99	100	53	56	92	74	33	73
Attainment Level	3	3	3	3	3	3	2	3	3	3	3	0	3	3	3	1	1	3	3	0	3
No of students not attempted the question	35	44	23	44	40	40	53	77	35	97	10	54	18	25	13	13	46	64	60	69	0







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CO attainment of UT		Weighted average of Internal and External			CO-PO Correlation Table													
					PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	2.5	2.9																
CO2	1.8	2.8	CO1	3	3													
CO3	2.7	2.9	CO2	3	3													
CO4	0	2.4	CO3	3		2			2	2								
CO5	3	3	CO4	3	3	2			2	2								
CO6	0	2.4	CO5	3	3	2												
			CO6	3	3	3	3	3	2	2					2	3	3	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	2.9	2.9												
CO2	2.8	2.8												
CO3	2.9		2		2	2								
CO4	2.4	2.4	1.6		1.6	1.6								
CO5	3	3	2											
CO6	2.4	2.4	2.4	2.4	1.6	1.6					1.6	2.4	2.4	

Weighted Average-Achieved	2.7	2.7	2	2.4	1.7	1.7							1.6	2.4	2.4
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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	2.9	2.9												
CO2	2.8	2.8												
CO3	2.9		2.9		2.9	2.9								
CO4	2.4	2.4	2.4		2.4	2.4								
CO5	3	3	3											
CO6	2.4	2.4	2.4	2.4	2.4	2.4					2.4	2.4	2.4	

Threshold Based	2.7	2.7	2.7	2.4	2.6	2.6						2.4	2.4	2.4
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