2.6.2 *Attainment of PO, PSO and CO*

Attainment of Course Outcomes

Attainment of Course Outcomes

In the Outcome Based Education (OBE), assessment is done through one or more than one processes, carried out by the department, that identify, collect, and prepare data to evaluate the achievement of course outcomes (CO's).

The process for finding the attainment of Course outcomes uses various tools/methods. These methods are classified into two types: **Direct methods and indirect methods.**

- Direct methods display the student's knowledge and skills from their performance in the class/assignment test, internal assessment tests, assignments, semester examinations, seminars, laboratory assignments/practicals, mini projects etc. These methods provide a sampling of what students know and/or can do and provide strong evidence of student learning.
- Indirect methods such as course exit survey and examiner feedback to reflect on student's learning. They are used to assess opinions or thoughts about the graduate's knowledge or skills.

Rubrics are used for both formative and summative assessment of students. Same rubric is used for assessing an outcome so that the faculty is able to assess student progress and maintain the record of the same for each student. The rubrics are shared with students before being evaluated so that they are aware of the performance criteria and their weightage.

Following tables show the various methods used in assessment process that periodically documents and demonstrates the degree to which the Course Outcomes are attained. They include information on:

a) Listing and description of the assessment processes used to gather the data, and

b) The frequency with which these assessment processes are carried out.

Table 1 : Direct Assessment tool used for CO attainment

Sr. No.	Direct Assessment Method	Assessment frequency	Description
1.	Internal Assessment Test	Twice in a Semester	The Internal Assessment marks in a theory paper shall be based on two tests generally conducted at the end of 6th and 11th weeks of each semester. It is a metric used to continuously assess the attainment of course outcomes w.r.t course objectives. Average marks of two tests shall be the Internal Assessment Marks for the relevant course.
2.	Lab Assignments / experiments	Once in a week	Lab Assignment/Experiment is a qualitative performance assessment tool designed to assess students' practical knowledge and problem solving skills. Minimum ten experiments need to be conducted for every lab course.
3	End Semester Examination	Once in a Semester	End Semester examination (theory or practical) are the metric to assess whether all the course outcomes are attained or not framed by the course incharge. End Semester Examination is more focused on attainment of all course outcomes and uses a descriptive questions.
4	Practical Semester Examination		
5	Home Assignments	Twice in a Semester	Assignment is a metric used to assess student's analytical and problem solving abilities. Every student is assigned with course related tasks & assessment will be done based on their performance. Grades are assigned depending on their innovation in solving/deriving the problems.

6	Class / Assignment Test	Twice in a Semester	It is a metric used to continuously assess the student's understanding capabilities.
7	Preliminary Examination	Once in a semester	Preliminary examination is the metric to assess whether all the course outcomes are attained or not by asking descriptive questions.
8	Presentations	As per the requirement	Presentation is the metric used to assess student's communication and presentation skills along with depth of the subject knowledge. Seminars topics are given to the students that cover topics of current interest or provide in-depth coverage of selected topics from the core courses.

Table 2: Indirect Assessment tool used for CO attainment

Sr. No.	Indirect Assessment Method	Assessment frequency	Method Description
1	Course Exit Survey	End of Semester	Collect variety of information about course outcomes from the students after learning entire course.

The weightages given for various assessment tools used for the attainment of Course Outcomes are shown in the following figure 1 and table 3

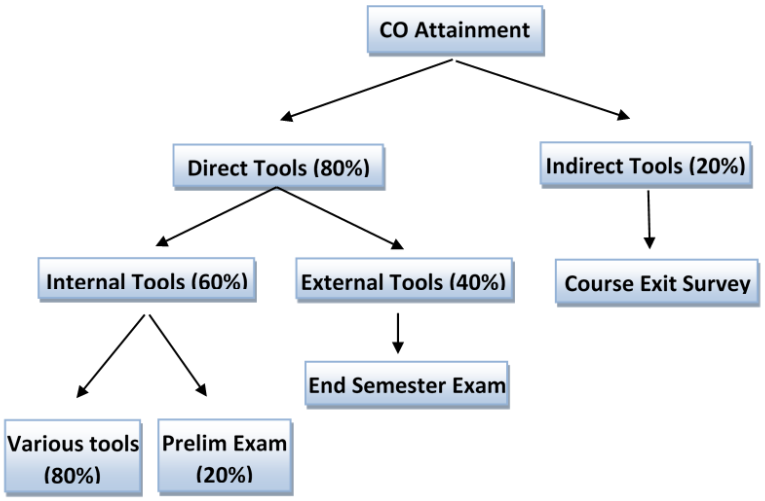


Figure 1: List of Course Assessment tools

Table 3: List of Course Assessment tools

			Tools	Frequency	Weightage		
Assessment Tools	**Direct**	**Internal Tools**	Assignment tests	Twice in a semester	**80 %**	**60%**	**80%**
			Internal assessment	Twice in a semester			
			Home Assignments	Selected Topic			
			Practical	Weekly			
			MOCK Practicals	Once in a semester			
			MCQ				
			Seminar/Presentations				

			Mini Projects				
			Preliminary Examination	Once in a semester	**20 %**		
		External Tools	End Semester Examination	Once in a semester		**40%**	
	Indirect	**--**	Course Exit Survey/ Examiners feedback	Once in a Semester			**20%**

Process to set Goal for course (effective from Second Half of 2015)

Course Outcome Attainment level is set based on previous three years' average performance levels in the university examination in that course. Process is given below:

1. Find out the average marks scored in each course in the last three years.
2. Find the number of students scoring above the average marks
3. This is set as middle level of goal setting [Level-2]
4. Depending on the trend of the result the lower level [Level-1] can be set by reducing 5% of the students score than the middle level.
5. The upper level [Level-3] can be set by increasing 5% of the students score than the middle level.

(Eg: Course Name: CSC305)

Process done in SH-2015

YEAR	SH-2012(OLD)	SH-2013	SH-2014	AVG of SH-2012,SH-2013,SH-2014
Total Students	73	75	75	74
Total Marks	3133	3649	2676	3153
Class Average Marks (Total Marks/Total Students)	43	49	36	42
% Class Average Marks	54	61	45	53
Number of students achieved the Average Marks	43	40	32	38
% of the Number of students achieved the Average Marks	59	53	43	53

Goal Set for DS (III SEM)		
% of the student	% of marks	Level
58%	53%	*3*
53%	53%	*2*
48%	53%	*1*

*** As Attainment Level 3 is less than 50%, Revised Goal Set is**

Attainment Goal for DS SH-2015 (III SEM)		
% of the student	% of marks	Level
60%	53%	*3*
55%	53%	*2*
50%	53%	*1*

Change of goal setting:

The Set level will be changed if all Course Outcomes of the subject are attained the Level-3. This change in the goal can be done in two ways, either increase the average marks obtained by the students or increase the percentage of students securing more than the average marks. Since we have to bring maximum students to level-3 category, the change of average marks will set only after 90% students securing more than previous average marks. Once it is achieved increase the goal set by 2 – 5%

Course Outcomes

CO-ID	CO-Statement
C305.1	Demonstrate the concept of linear, nonlinear data structure
C305.2	Design an algorithm to implement stack, queue data structures and apply the concept for an application
C305.3	Design an algorithm to implement linked list data structures and apply the concept for an application
C305.4	Demonstrate the concept of tree and apply to solve the problems
C305.5	Demonstrate the concept of graph and apply to solve the problems
C305.6	Design an algorithm to implement sort and search operations

CO-PO and CO-PSO Correlation

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CSC305.1	3	2	--	1	--	--	--	--	--	--	--	--	3	1
CSC305.2	2	3	3	3	--	--	--	--	--	--	2	3	3	2
CSC305.3	2	2	3	3	--	--	--	--	--	--	2	3	3	2
CSC305.4	3	--	2	2	--	--	--	--	--	--	--	3	3	1
CSC305.5	3	--	2	2	--	--	--	--	--	--	--	2	3	1
CSC305.6	2	3	3	--	--	--	--	--	--	--	2	3	3	2
Average	**3**	**3**	**3**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**3**	**3**	**2**

Tools used for CO attainment

CO-ID	CO Statement	Tool1	Tool2
C305.1	Demonstrate the concept of linear, nonlinear data structure	Assignment Test-1	Internal Assessment-1
C305.2	Design an algorithm to implement stack, queue data structures and apply the concept for an application	Assignment Test-1	Internal Assessment-1
C305.3	Design an algorithm to implement linked list data structures and apply the concept for an application	Assignment-1	Internal Assessment-1
C305.4	Demonstrate the concept of tree and apply to solve the problems	Class Test-1	Internal Assessment-2
C305.5	Demonstrate the concept of graph and apply to solve the problems	Assignment Test-2	Internal Assessment-2
C305.6	Design an algorithm to implement sort and search operations	Assignment Test-2	MCQ-1

Question Papers used as a tools

i. Internal Assessment-1

Q. No			**Marks**	**CO**
1	Answer any five			
	a	Exemplify linear and non-linear Data structures	**2**	**(CO-1)**
	b	Demonstrate Circular and Priority Queue.	**2**	
	c.	State the difference between Singly Linked List and	**2**	
	d	Define ADT for Stack. List applications of Stack	**2**	
	e	List out the areas in which data structures are applied	**2**	
	f.	Exemplify infix, postfix and prefix expression.	**2**	
2	Answer any one		**5**	**(CO-3)**
	a.	Write a program to implement a creation of a singly		
		i) Inserting a node at the end		
		ii) Delete a node last node		
	b.	Write a program to implement creation of a doubly		
		i) Inserting a node after a specific node		
		ii) Delete a node after a specific node		
3	Answer any one		**5**	**(CO-2)**
	a	Develop a C program for queue using array		
	b	Develop a program for evaluation of postfix expression		

ii. Internal Assessment-2

Q. No			**Marks**	**CO**
1	Answer any five			
	a	Exemplify threaded binary tree.	**2**	**(CO-4)**
	b	Draw Expression tree for infix expression (a+b)*(c-d)/f	**2**	
	c	Explain concept of Binary Search Tree with example	**2**	
	d	Compare B tree with B+ tree	**2**	
	e	Exemplify Splay tree .	**2**	
	f	Exemplify trie data structure	**2**	
2	Answer any one		**5**	**(CO-5)**
	a	Exemplify different ways to represent graph .		
	b	Write the function for BFS Traversal of a graph. Explain its working with an example		
	Answer any one			

3	a	Apply the Huffman coding for the word MALAYALAM. Give the Huffman code for each symbol	**5**	**(CO-4)**
	b.	Insert the following elements in AVL tree 44,17,32,78,50,88,48,62,54		

iii. Assignment Test-1

Q. No	**Set-A**	**Marks**	**CO**
1	Exemplify Different types of data structure .	5	CO-1
2	Illustrate applications of stack and queue	5	
3	Write a program for circular queue using array	10	CO-2
Q. No	**Set-B**	**Marks**	**CO**
1	Write Stack ADT and explain various applications of stack	5	CO-1
2	Demonstrate different application areas of data structures	5	
3	Write a program for Postfix Evaluation	10	CO-2

iv. Assignment Test-2

Q. No	**Set-A**	**Marks**	**CO**
1	Apply Quick Sort with following data 50,31,71,38,77,81,12,33	5	CO-6
2	Exemplify BFS.	5	CO-5
3	Apply Radix Sort on 121,70,965,432,12,577,683	5	CO-6
4	Apply Heap Sort on 15,19,10,7,17,16	5	CO-6
Q. No	**Set-B**	**Marks**	**CO**
1	Apply Quick Sort 30,70,20,50,40,10,60,80	5	CO-6
2	Exemplify DFS	5	CO-5
3	Apply Heap Sort on 121,70,965,432,12,577,683	5	CO-6
4	Apply Insertion on Sort 10,5,4,12,15,11,3	5	CO-6

iv. Prelim Question Paper

Questions			Mark	CO
Q.1 a.	Exemplify Linear and Non-linear data structures .		**5**	**CO1**
Q.1 b.	State the difference between Singly linked list and Doubly linked list along with their application		**5**	**CO3**
Q.1 c.	Write a C program for Insertion Sort		**7**	**CO6**
Q.1 d.	Define ADT with an example		**3**	**CO1**
Q. 2 a.	Construct Huffman Tree and determine the code for following characters of word "DATASTRUCTURES"		**10**	**CO4**
Q. 2 b.	Write a C program for Postfix Evaluation		**10**	**CO2**
Q. 3 a.	Write a C program in C to implement a priority queue.		**10**	**CO3**
Q. 3 b.	Sort the elements using Radix Sort 121, 70, 965, 12,577,683. What are the limitations of radix sort		**10**	**CO6**
Q. 4 a.	Write a C program to create "Circular Linked List" ADT. The ADT should support the Following operations		**10**	**CO3**
	i)	Creating a Circular Linked List		
	ii)	Inserting a node after a specific node		
	iii	deleting a node		
	iv)	Displaying list		
Q. 4 b	Demonstrate various Graph Traversing Techniques.		**10**	**CO5**
Q. 5 a.	Demonstrate the AVL trees. Insert the following elements in a AVL tree 27,25,23,29,35,33,34		**10**	**CO4**
Q. 5 b.	Using linear probing and quadratic probing insert the following Values in Hash table of size 10. Show how many collisions occur in each techniques 99,33,23,44,56,43,19		**10**	**CO6**
Q. 6 a.	Exemplify index sequential search with a suitable example. State the advantages and disadvantages of index sequential search		**10**	**CO6**
Q. 6 b.	Write a program in C for deletion of a node from Binary Search Tree. The program should consider all the cases		**10**	**CO4**

CO-Tool Marks

Roll No	Name of Student	CO1		CO2		CO3		CO4		CO5		CO6		Common Tools	
		AT-1	IA-1	AT-1	IA-1	ASS-1	IA-1	CT-2	IA-2	AT-2	IA-2	AT-2	MCQ	ESE	PRELIM
Maximum Marks		**10**	**10**	**10**	**5**	**10**	**5**	**20**	**10**	**5**	**5**	**15**	**5**	**80**	**80**
101601	A Annie Grace C	6	7	2	1	8	5	8	10	4	5	6	5	56	56
101602	Agwekar Atharva Ajit	3	10	7	5	9	5	0	10	5	5	1	5	64	76
101603	Banagar Amruta N.	7	1	1	4	5	5	9	9	5	5	5	0	55	73
101604	Bhilegaonkar Madhavi	4	7	3	1	6	4	10	10	0	3	8	3	38	56
101605	Borhade Vipul Gulabrao	4	4	0	5	9	5	17	10	4	5	7	3	55	44
101606	Bothraa Siddhi R.	3	10	5	5	9	1	8	9	4	5	6	5	62	72
101607	Britto Cyrus Valerian	2	9	4	0	8	5	8	9	4	5	9	5	51	60
101608	Cherian Joel Mathew	5	8	0	1	9	5	9	10	0	5	0	0	54	37
101609	Clarence Johnson	4	8	2	0	8	4	8	8	5	4	1	5	51	37
101610	Dalvi Anuj Shrikrishna	3	10	5	4	9	0	0	8	5	4	1	5	45	55
101611	Dandona Raveena	7	9	6	1	8	3	19	8	1	5	1	5	43	75
101612	Deshpande Siddhesh S	2	8	5	5	0	4	10	9	2	5	1	5	52	76
101613	Dsouza Aditya Sanjay	5	10	8	5	9	3	0	10	5	5	1	5	66	42
101614	Dutta Piya	6	9	4	1	8	5	15	8	0	4	0	0	33	50
101615	Fernandez Ahan Nelson	2	10	7	5	9	3	10	8	5	5	1	5	53	48
101616	Freddy Poly	3	10	7	1	9	5	16	10	5	3	1	5	49	76
101617	Gavin Henry Lewis	2	10	7	3	8	5	9	10	5	5	1	5	62	46
101618	Jackson Jonathan Bob	2	9	3	1	9	2	8	7	1	1	1	5	20	34
101619	Jadhav Tejesh Prakash	6	10	8	4	0	0	0	9	4	5	5	4	46	34
101620	Jithin K Thomas	2	6	7	1	8	0	9	8	0	2	0	0	32	56
101621	Joseph Blessingh Israel	4	8	7	3	8	4	10	9	0	5	0	0	54	66
101622	Kanatt Shruti Raju	5	8	6	5	8	5	10	8	2	4	1	5	62	43
101623	Kankariya Akash Sunil	6	3	4	4	9	4	10	9	5	3	1	5	58	41
101624	Kesarwani Saumya	4	9	0	5	7	0	16	10	5	5	1	5	57	76
101625	Khattar Rajshankar S.	4	8	0	5	8	5	9	10	4	5	1	5	65	28
101626	Kochara Abishai Aswini	5	10	5	1	0	4	8	10	4	5	9	0	32	75
101627	Kulkarni Arya Deepak	7	10	7	5	8	5	0	10	2	5	1	5	61	60
101628	Magdum Kaustubh	8	10	7	5	6	2	11	10	5	5	1	5	65	75
101629	Makasare Gaurav R	5	10	8	5	9	5	10	10	4	5	1	5	56	64
101630	Mathias Jovin Vincent	3	10	0	1	8	5	8	10	5	5	1	5	57	53
101631	Mathias Sandesh Sunny	8	10	7	0	9	0	8	9	0	5	0	0	46	65
101632	Mendes Edelquinn	4	9	7	5	9	5	9	10	2	3	1	5	60	50
101633	Nair Shruthi Viju	5	8	3	5	9	4	20	10	4	5	1	5	63	70
101634	Nimmy Augustine	5	10	7	4	8	5	18	10	0	5	0	0	60	57
101635	Nirmal Babu	2	10	7	5	7	5	0	10	4	3	1	4	55	68
101636	Noronha Ryan Sunil	3	0	4	1	6	4	18	9	5	0	1	5	49	56
101637	Pai Shreya Rajendra	4	7	7	4	9	5	13	9	5	5	1	4	61	59

101638	Palani Salome Nelson	5	10	7	4	1	5	14	8	5	5	6	5	64	46
101639	Parab Omkar Tulsidas	2	9	7	5	9	0	0	10	5	4	1	5	54	69
101640	Patel Naeem	4	10	7	0	5	5	0	10	0	3	9	5	63	71
101641	Patel Srujan	7	9	4	4	9	5	18	9	0	5	0	0	62	52
101642	Patil Anuja Dilip	4	9	1	5	9	4	11	9	5	5	1	5	62	56
101643	Patil Vaibhav Prakash	6	9	5	4	9	4	8	10	0	5	0	0	61	61
101644	Pereira Terrell Russel	8	10	7	0	7	5	10	10	0	5	9	0	50	65
101645	Philip Prasun Alexander	5	7	7	0	9	5	17	10	5	5	1	5	62	57
101646	Pushkarna Himanshu A.	3	10	2	4	9	5	0	10	4	1	1	5	41	74
101647	Reddy C Sai Vivaswanth	3	10	3	0	8	5	12	10	4	3	1	5	61	45
101648	Roselyn Lorson	0	5	6	6	7	7	6	19	5	7	6	7	31	19
101649	Shetty Shubham Dinesh	1	4	7	7	7	6	4	19	7	7	7	7	35	35
101650	Shinde Ankita Vijay	1	0	5	5	7	7	1	16	5	7	6	7	31	9
101651	Shinde Shantanu S.	2	0	5	7	7	7	0	10	7	7	7	5	50	1
101652	Shingate Kranti Bhau	1	5	5	5	7	6	0	11	7	7	6	5	46	6
101653	Singh Siddarth Satbir	0	2	6	7	7	6	4	13	7	7	7	7	41	18
101654	Sohi Yashveer Singh	6	4	6	5	7	6	0	12	5	5	6	7	47	11
101655	Srivastava Animesh N.	3	3	6	7	7	7	1	20	7	7	7	7	46	17
101656	Tanya Serah Jacob	4	14	8	6	7	7	0	19	7	7	7	5	45	38
101657	Telang Shruti Vikas	2	8	5	6	7	5	0	8	7	7	6	5	36	8
101658	Tiwari Dipak Kamlesh	9	14	8	7	7	5	7	20	7	7	7	7	24	69
101659	Varghese Jacob	1	10	5	6	7	7	4	19	5	7	6	7	32	46
101660	Vellikkara Harun Joe	0	4	5	7	7	7	1	17	7	7	7	7	44	17
101661	Verma Pragya Surendra	0	4	6	6	7	7	0	13	5	6	6	5	11	6
101662	Waghmare Ashriel S.	0	6	5	7	5	6	0	12	7	6	7	5	21	15
101663	Waghulade Mithilesh R.	1	13	5	5	7	7	4	16	5	7	6	7	42	27
101665	Jadhav Amey	1	9	5	7	7	6	2	11	7	6	7	7	36	33
101666	Patil Manali	0	3	5	6	7	6	6	13	7	7	6	5	37	14

Calculations

Total Student Present in semester 3	Course Outcome '1'				Course Outcome '2'			
	Demonstrate the concept of linear,nonlinear data structure				Illustrate and apply the concept of stack, queue data structure in various applications.			
	Assignment Test-1		Internal Assessment-1		Assignment Test-1		Internal Assessment-1	
	Total Students acheived Goal	% of Students acheived Goal	Total Students acheived Goal	% of Students acheived Goal	Total Students acheived Goal	% of Students acheived Goal	Total Students acheived Goal	% of Students acheived Goal
65	19	29.23%	61	93.85%	25	38.46%	41	63.08%

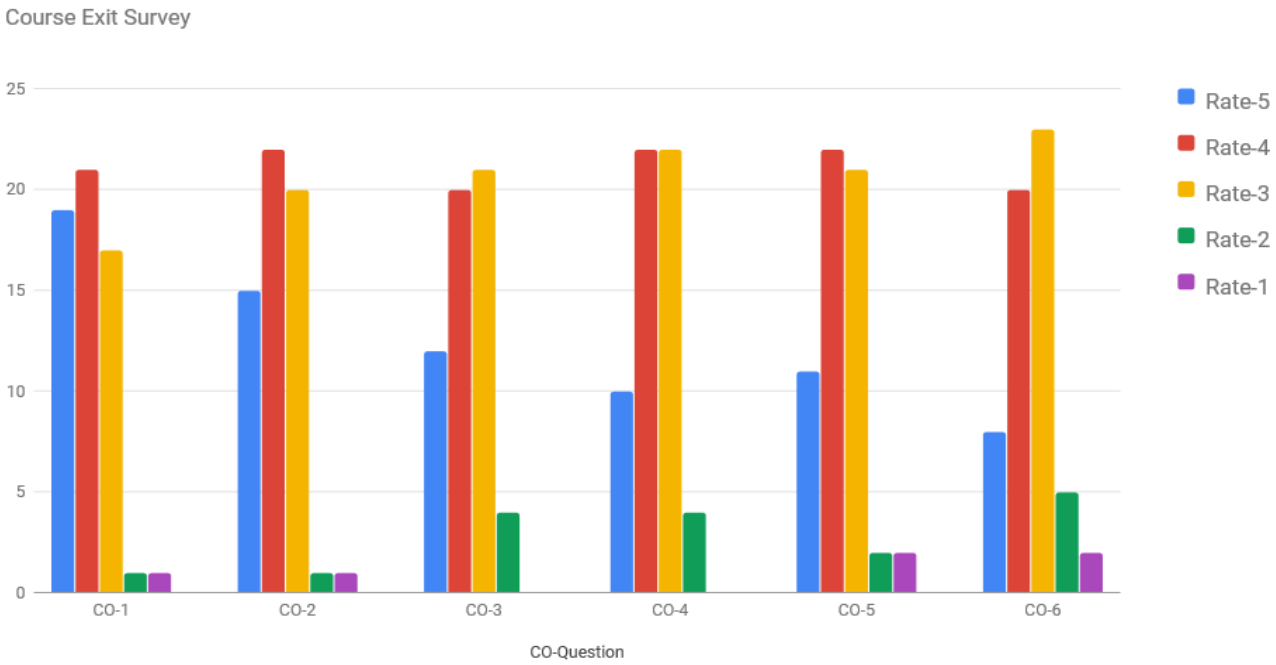
Total Student Present in semester 3	Course Outcome '3'				Course Outcome '4'			
	Illustrate and apply the concept of linked list data structure in various applications.				Demonstrate and apply the concept of tree data structure in various applications.			
	Assignment-1		Internal Assessment-1		Class Test-1		Internal Assessment-2	
	Total Students acheived Goal	% of Students acheived Goal	Total Students acheived Goal	% of Students acheived Goal	Total Students acheived Goal	% of Students acheived Goal	Total Students acheived Goal	% of Students acheived Goal
65	56	86.15%	51	78.46%	23	35.38%	65	100%

Total Student Present in semester 3	Course Outcome '5'				Course Outcome '6'			
	Demonstrate the concept of graph data structure.				Illustrate the understanding of sort and search algorithms.			
	Assignment Test-2		Internal Assessment-2		Assignment Test-2		MCQ-1	
	Total Students acheived Goal	% of Students acheived Goal	Total Students acheived Goal	% of Students acheived Goal	Total Students acheived Goal	% of Students acheived Goal	Total Students acheived Goal	% of Students acheived Goal
65	42	64.62%	58	89.23%	45	69.23%	50	76.92%

Total Student Present in semester 3	Tool1		Tool3	
	End Semester Exam		Prelim Exam	
	Total Students acheived Goal	% of Students acheived Goal	Total Students acheived Goal	% of Students acheived Goal
65	54	83.08%	55	85%

Summary of Course Exit Survey

CO-QUE	Course Outcome Question	Rating Percentage										Average %	CO-Question Attainment
		No of students rated											
		'5'	%	'4'	%	'3'	%	'2'	%	'1'	%		
		Total number of students given Course Exit Survey							'60'				
1	Rate yourself based on understanding of the concept of linear, nonlinear data structure	19	32%	21	35%	17	28%	1	2%	1	2%	78%	3
2	Rate yourself based on ability of designing an algorithm to implement stack, queue data structures and apply the concept for an application	15	25%	22	37%	20	33%	1	2%	1	2%	75%	3
3	Rate yourself based on ability of designing an algorithm to implement linked list data structures and apply the concept for an application	12	20%	20	33%	21	35%	4	7%	0	0%	70%	3
4	Rate yourself based on understanding of the concept of tree and apply to solve the problems	10	17%	22	37%	22	37%	4	7%	0	0%	71%	3
5	Rate yourself based on understanding the concept of graph and apply to solve the problems	11	18%	22	37%	21	35%	2	3%	2	3%	71%	3
6	Rate yourself based on ability of designing an algorithm to implement sort and search operations	8	13%	20	33%	23	38%	5	8%	2	3%	67%	2



Goal Set (SH-2017)

% of Marks	% of Student	Attainment Level
53%	55%	**1**
53%	**60**%	**2**
53%	65%	**3**

Summary of Course Assessment Calculation

CO-ID	Course Outcome	Internal Assessment						External Assessment		Final Attainment Level
		Direct Assessment			Indirect Assessment	Int. Attainment %	Int. Attainment Level	Ext Attainment %	Ext Attainment Level	
		Tool1	Tool2	Prelim	Course Exit Survey					
		80%		20%						
		80%			20%					
		60%						40%		
C305.1	Demonstrate the concept of linear, nonlinear data structure	***AT-1***	***IA-1***	85%	78%	68.58	2	83.08%	3	2.4
		29.23%	93.85%							
C305.2	Design an algorithm to implement stack, queue data structures and apply the concept for an application	***AT-1***	***IA-1***	85%	75%	61.1	1	83.08%	3	1.8
		38.46%	63.08%							
C305.3	Design an algorithm to implement linked list data structures and apply the concept for an application	***AT-1***	***IA-1***	85%	70%	80.28	3	83.08%	3	3
		86.15%	78.46%							
C305.4	Demonstrate the concept of tree and apply to solve the problems	***CT-1***	***IA-2***	85%	71%	71.12	3	83.08%	3	3
		35.38%	100%							
C305.5	Demonstrate the concept of graph and apply to solve the problems	***AT-2***	***IA-2***	85%	71%	77.03	3	83.08%	3	3
		64.62%	89.23%							
C305.6	Design an algorithm to implement sort and search operations	***AT-2***	***MCQ-1***	85%	67%	73.77	3	83.08%	3	3
		69.23%	76.92%							

CO-PO and CO-PSO Attainment

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CSC305.1	2.4	2.4	--	2.4	--	--	--	--	--	--	--	--	2.4	2.4
CSC305.2	1.8	1.8	1.8	1.8	1.8	--	--	--	--	--	1.8	1.8	1.8	1.8
CSC305.3	3	3	3	3	3	--	--	--	--	--	3	3	3	3
CSC305.4	3	--	3	3	--	--	--	--	--	--	--	3	3	3
CSC305.5	3	--	3	3	--	--	--	--	--	--	--	3	3	3
CSC305.6	3	3	3	--	--	--	--	--	--	--	3	3	3	3
Average	**2.7**	**2.6**	**2.8**	**2.6**	**2.4**	**--**	**--**	**--**	**--**	**--**	**2.6**	**2.8**	**2.7**	**2.7**

Attainment of Program Outcomes and Program Specific Outcomes

Attainment of POs and PSOs:

Assessment tools are categorized into **Direct and Indirect** methods to assess the program outcomes. **80% weightage is given to direct methods and 20% to indirect methods.**

- Direct methods display the students' knowledge and skills from their performance in the various academic activities like Internal Assessment Exams, End–Semester Examinations, Assignment/Class Tests, Presentations, and Home Assignments, Quizzes, Practicals etc. These methods provide a sampling of what students know and/or can do and provide strong evidence of student learning. Average of CO-PO attainment of all the courses is considered as direct method assessment tool for PO attainment.
- Indirect methods such as surveys and interviews of the stakeholders to reflect on student's learning. They assess opinions or thoughts about the graduates' knowledge or skills valued by different stakeholders. The various indirect tools are:
  - Program Exit Survey
  - Surveys conducted on Co-curricular and Extra-curricular activities (PO6 and PO7).

The average of PO attainment of all surveys is considered for calculating the PO attainment. the following figure 1 shows the various methods/tools used for calculating the PO attainment along with weightage given to each method.

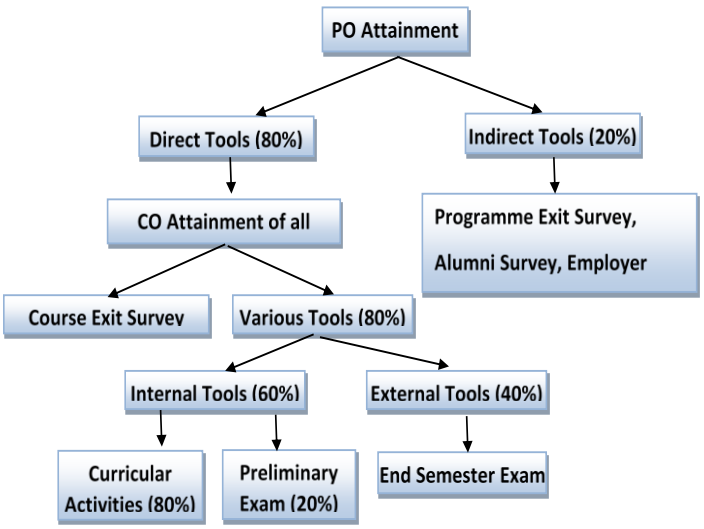


Figure 1: List of Program Assessment tools

The Programme outcomes are difficult to measure such as assessing critical thinking, creativity, analytical skills, and problem solving etc. Hence the department has adopted Criterion Referenced Rubrics to assess the POs. The Rubric criteria are developed by department faculty and distributed to students before being evaluated so that they are aware of the performance criteria and their weightage.

The methods/tools used for the assessment process that periodically documents and demonstrates the degree to which the Programme Outcomes are attained are shown below including the information on:

a) Listing and description of the assessment processes used to gather the data, and

b) The frequency with which these assessment processes are carried out.

Table 1: Direct Assessment tool used for PO attainment

Sr. No.	Direct Assessment Method	Assessment frequency	Description
1.	CO attainment of all courses	Once in a Semester	Minimum two internal tools (internal assessment test, class/assignment test, seminar, quiz, practical, mini project etc.) are used to find the attainment of each course outcome along with the performance of the students in preliminary exams and end semester exams. the weightage provided for that is 80%. Course exit survey is also considered for the attainment, that is conducted at the end of the semester and 20% weightage is given for that.

Table 2: Indirect Assessment tool used for PO attainment

Sr. No.	Indirect Assessment Method	Assessment frequency	Method Description
1	Alumni Survey	Once in two years	Collect variety of information about program outcomes from the Alumni students.
2	Program Exit Survey	Once in a year	Collect variety of information about program outcomes from the outgoing students
3	Employer Survey	Once in two years	Collect variety of information about the graduates' skills, capabilities and opportunities
4	Survey on Co and Extra-curricular activities	Once in a year on all activities	Collect variety of information on students capabilities and opportunities.

The attainment of Course outcomes of every course is directly mapped to Program Specific Outcomes.

PO Attainment of Academic Year of 2018-2019 (computer Engineering Dept.)

Subject Code	Subject Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
FEC101	AM-I	3	3	--	--	3	--	--	--	--	--	--	--	--	--
FEC102	AP-I	3	3	--	3	--	3	3	--	--	--	--	3	--	--
FEC103	AC-I	3	--	--	--	--	3	3	--	--	--	--	3	--	--
FEC104	EM	3	3	--	--	--	--	--	--	--	--	--	3	--	--
FEC105	BEE	2.5	2.6	--	2.6	--	--	--	--	2.5	--	--	--	--	--
FEC106	EVS	3	--	--	--	--	3	3	3	--	--	--	--	--	--

FEC201	AM-II	2.9	2.9	--	--	3	--	--	--	--	--	--	--	--	--
FEC202	AP-II	3	3	--	--	--	3	--	--	--	--	--	--	--	--
FEC203	AC-II	2.8	--	--	--	--	2.8	3	--	--	3	--	3	--	--
FEC204	ED	3	3	--	--	3	--	--	--	--	--	--	3	--	--
FEC205	SPA	3	3	3	--	--	--	--	--	--	--	--	--	--	--
FEC206	CS	--	--	--	--	3	3	--	--	3	3	3	3	--	--
CSC301	AM -III	3	3	--	--	--	--	--	--	--	--	--	3	3	--
CSC302	DLDA	3	3	3	--	3	--	--	--	--	--	--	3	3	3
CSC303	DIS	3	3	3	--	--	--	--	--	--	--	--	3	3	--
CSC304	ECCF	2.6	2.6	--	--	--	--	--	--	--	2.6	--	--	--	2.6
CSC305	DS	2.6	2.7	2.4	3	--	--	--	--	--	--	--	3	2.7	2.7
CSL301	DSL	2.7	3	3	--	3	--	--	--	--	--	--	3	2.8	3
CSL302	BEL	1.6	1.6	--	--	--	--	--	--	--	--	--	--	--	1.6
CSL303	DSL	2.2	2.2	2.2	--	--	--	--	--	--	--	2.2	2.2	2.2	2.2
CSL304	OOPL	2.5	2.6	2.6	3	3	--	--	--	--	--	--	2.4	2.6	2.6
CSC401	AM-IV	2.2	2.2	--	--	--	--	--	--	--	--	--	--	2.2	--
CSC402	AOA	3	3	3	--	3	--	--	--	--	--	3	3	--	--
CSC403	COA	1.2	1.4	1	--	1.4	--	--	--	--	--	--	1	--	--
CSC404	CG	3	3	3	3	--	--	--	--	--	--	--	3	3	3
CSC405	OS	1	1	1	1	--	--	--	--	--	--	--	1	1	1
CSL401	AOAL	--	3	3	--	--	--	--	--	--	--	3	3	3	3
CSL402	CGL	3	3	3	3	3	--	--	3	3	3	3	3	3	3
CSL403	PAL	1	1	1	--	1	--	--	--	--	--	--	1	1	--
CSL404	OSL	1	1	1	--	1	--	--	--	--	--	--	1	1	1
CSL405	OSTL	1.5	--	1.5	1.5	1.5	--	--	--	--	--	--	1.5	1.5	1.5
CPC501	MP	1.6	1.6	1.6	--	--	--	--	--	--	--	--	1	--	1.6
CPC502	OS	2.4	2.4	3	--	--	--	--	--	--	--	--	2.3	2.4	2.6
CPC503	SOOAD	3	3	3	3	--	--	--	3	--	--	3	3	3	3
CPC504	CN	3	3	3	--	3	--	--	--	--	--	--	3	3	3
CPL501	WTL	3	3	3	3	3	--	--	1.8	1.8	1.8	1.8	2.4	2.8	1.8
CPL502	BCE	--	--	--	--	--	3	--	3	3	3	3	3	3	3
CPC601	SPCC	2.9	3	2.9	--	3	--	--	--	--	--	--	2.8	2.9	2.9
CPC602	SE	2.2	2.2	1.6	1	1.8	1.6	--	2.2	1.8	--	1.6	2.2	--	2
CPC603	DD	2.2	1.6	2.2	--	--	--	--	1	--	--	1.8	2.2	2	2
CPC604	MCC	3	3	3	--	3	--	--	--	--	--	--	3	3	3

CPE6011	SPM	2.2	--	--	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	--	2.2
CPL601	NPL	--	1	1	--	1	--	--	1	1	1	--	1	1	1
CPC701	DSP	3	3	--	--	--	--	--	--	--	--	--	--	--	--
CPC702	CSS	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	--	--	--	2.2	2.2	2.2
CPC703	AI	1	1.3	1.3	1.6	1.2	1	1.6	--	--	--	--	1.2	1.3	1.3
CPE70425	SC	3	3	3	--	3	--	--	--	--	--	--	3	3	3
CPE70426	ERP	3	3	3	3	3	--	--	--	--	3	--	3	3	3
CPP701	PROJECT I	--	2.9	--	2.9	2.9	2.9	--	--	--	--	--	--	2.9	2.9
CPL701	NTAL	--	2.8	2.8	2.4	2.8	--	--	2.8	2.8	2.8	--	2.8	--	--
CPC801	DWDM	2	1.6	1.6	2.2	2.2	--	--	--	--	--	--	2.2	--	--
CPC802	HMI	2.2	2.2	2.2	2.2	2.2	2.2	--	--	--	--	--	2.2	2.2	2.2
CPC803	PDS	2.2	2.2	2.2	2.2	2.2	--	--	--	--	--	2.2	2.2	2.2	2.2
CPE8031	ML	1.1	1.1	1.2	1.1	1.2	--	--	--	--	--	--	1.1	1.1	1.2
CPE8035	BDA	2.2	2.2	2.2	--	2.2	--	--	--	2.2	--	--	2.2	2.2	2.2
CPP802	PROJECT II	--	--	--	--	--	--	3	3	3	3	3	3	3	3
CPL801	CCL	1.6	1.7	1.6	--	1.5	1	--	--	1	1	1	1.4	--	--
Direct Attainment (80%)		2.4	2.4	2.3	2.2	2.2	2.6	2.7	2.4	2.4	2.5	2.5	2.3	2.4	2.3
Indirect Attainment (20%)	Program Exit Survey (50%)	3	3	3	3	3	3	3	3	3	3	3	3	--	--
	Extra Curricular Actvities (50%)	--	--	--	--	--	--	--	2	3	3	3	3	--	--
Average Attainment		2.52	2.52	2.44	2.36	2.36	2.68	2.76	2.42	2.52	2.6	2.6	2.44	2.4	2.3

PSO Attainment of Academic Year of 2018-2019 (computer Engineering Dept.)

Subject Code	Subject Name	PSO1	PSO2
FEC101	APPLIED MATHEMATICS-I	3	--
FEC102	APPLIED PHYSICS-I	3	--
FEC103	APPLIED CHEMISTRY -I	3	--
FEC104	ENGINEERING MECHANICS	3	--
FEC105	BASIC ELECTRICAL ENGINEERING	2.5	--
FEC106	ENVIRONMENTAL STUDIES	3	--
FEC201	APPLIED MATHEMATICS-II	2.9	--
FEC202	APPLIED PHYSICS-II	3	--
FEC203	APPLIED CHEMISTRY-II	2.8	--
FEC204	ENGINEERING DRAWING	3	--
FEC205	STRUCTURED PROGRAMMING APPROACH	3	3
FEC206	COMMUNICATION SKILLS	--	3
CSC301	APPLIED MATHEMATICS -III	3	--
CSC302	DIGITAL LOGIC DESIGN AND ANALYSIS	3	3
CSC303	DISCRETE STRUCTURES	3	--
CSC304	ELECTRONIC CIRCUITS AND COMMUNICATION FUNDAMENTALS	--	2.6
CSC305	DATA STRUCTURES	2.7	2.7
CSL301	DIGITAL SYSTEM LAB	3	3
CSL302	BASIC ELECTRONICS LAB	--	2.2
CSL303	DATA STRUCTURE LAB	2.2	2.2
CSL304	OOPM(JAVA) LAB -	2.6	2.6
CSC401	APPLIED MATHEMATICS-IV	2.2	--
CSC402	ANALYSIS OF ALGORITHMS	3	3
CSC403	COMPUTER ORGANIZATION AND ARCHITECTURE	2	--
CSC404	COMPUTER GRAPHICS	3	3
CSC405	OPERATING SYSTEM	1.8	1.8
CSL401	ANALYSIS OF ALGORITHMS LAB	3	3
CSL402	COMPUTER GRAPHICS LAB	3	3
CSL403	PROCESSOR ARCHITECTURE LAB	2.6	--
CSL404	OPERATING SYSTEM LAB	2.6	2.6
CSL405	OPEN SOURCE TECH(PYTHON & PERL) LAB	2.2	2.2
CPC501	MICROPROCESSOR	--	1.6
CPC502	OPERATING SYSTEMS	2.4	2.6
CPC503	STRUCTURED AND OBJECT ORIENTED ANALYSIS AND DESIGN	3	3
CPC504	COMPUTER NETWORKS	3	3
CPL501	WEB TECHNOLOGIES LABORATORY	2.8	1.8
CPL502	BUSINESS COMMUNICATION AND ETHICS	3	3
CPC601	SYSTEM PROGRAMMING AND COMPILER CONSTRUCTION	2.9	2.9
CPC602	SOFTWARE ENGINEERING	--	3

CPC603	DISTRIBUTED DATABASES	2	2
CPC604	MOBILE COMMUNICATION AND COMPUTING	3	3
CPE6011	SOFTWARE PROJECT MANAGEMENT	--	3
CPL601	NETWORK PROGRAMMING LABORATORY	2.8	2.7
CPC701	DIGITAL SIGNAL PROCESING	3	--
CPC702	CRYPTOGRAPHY AND SYSTEM SECURITY	2.2	2.2
CPC703	ARTIFICIAL INTELLIGENCE	2.1	2.1
CPE70425	SOFT COMPUTING	3	3
CPE70426	ENTERPRISE RESOURCE PLANNING & SUPPLY CHAIN MANAGEMENT	3	3
CPP701	PROJECT I	2.7	2.7
CPL701	NETWORK THREATS AND ATTACKS LABORATORY	2.8	2.8
CPC801	DATA WAREHOUSE AND MINING	2.9	3
CPC802	HUMAN MACHINE INTERACTION	3	3
CPC803	PARALLEL AND DISTRIBUTED SYSTEMS	2.2	2.2
CPE8031	MACHINE LEARNING	2.2	2.3
CPE8035	BIG DATA ANALYTICS	2.2	2.2
CPP802	PROJECT II	2.7	2.7
CPL801	CLOUD COMPUTING LABORATORY	3	3
Average		**2.7**	**2.7**