

Implementation of Outcome Based Education

Computation of CO-PO Attainment

by
Dr. Rajat Kanti Samal
Assistant Professor

Internal Quality Assurance Cell
Veer Surendra Sai University of Technology
Burla, Odisha – 768018



- Attainment of **Course Outcomes**

- ① Direct attainment of COs is obtained from marks obtained by students.
- ② Indirect attainment of COs is obtained from a survey response by students at the end of the semester.
- ③ Final attainment of COs is obtained using

$$0.7 * (\text{CO Direct}) + 0.3 * (\text{CO Indirect})$$

- Attainment of **Program Outcomes**

- ① Direct attainment of POs is obtained from CO attainment
- ② Indirect attainment of POs is obtained from various surveys.
- ③ Final attainment of POs is the average of direct and all indirect.

- Attainment of **Program Specific Outcomes** is currently obtained from final CO attainment.

- Attainment of **Program Educational Objectives** is obtained from survey of alumni who have graduated within last 03-05 years.



Part-A: CAM and PAM (CO-PO Mapping)



Course Articulation Matrix in syllabus file

Course Outcome

Upon completion of the course, the students will demonstrate the ability to:

CO1	Compute load flow solution by using different techniques
CO2	Assess the stability of a power system.
CO3	Determine the economical load distribution between the generating buses incorporating the transmission losses.
CO4	Compute the state of power system following the different types of faults.
CO5	Describe automatic generation control schemes and methods to analyze active and reactive power control on a power system using simulation tools.

94

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	1	2	1	-	-	-	-	1
CO2	3	3	2	1	1	2	1	-	-	-	-	1
CO3	3	3	2	1	1	2	1	-	-	-	-	1
CO4	3	3	2	1	1	2	1	-	-	-	-	1
CO5	3	3	2	1	1	2	1	-	-	-	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	3	3	2	1	1	2	1	-	-	-	-	1



Program Articulation Matrix

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BMA2101	3	3	2	2	2	3	PO7	PO8	PO9	PO10	2	3
BCH2101	3	3	2	PO4	PO5	PO6	3	PO8	PO9	2	2	3
BEC2101	3	2	3	3	3	PO6	PO7	PO8	PO9	PO10	3	3
BCE2102	3	2	2	2	2	2	3	PO8	2	2	2	3
BCS2102	3	3	3	3	2	PO6	PO7	PO8	2	PO10	PO11	3
BCH2191	3	1	2	PO4	2	PO6	3	PO8	2	PO10	2	PO12
BEC2191	3	2	2	3	3	PO6	PO7	PO8	PO9	PO10	3	3
BCE2192	3	2	2	2	1	3	3	PO8	2	2	2	3
BCS2191	3	3	3	3	2	3	PO7	2	3	PO10	PO11	3
BMA2201	3	3	2	2	1	3	3	PO8	PO9	PO10	1	3
BPH2102	3	3	3	2	1	PO6	PO7	PO8	PO9	2	PO11	2
BEE2101	3	3	2	3	3	2	3	PO8	PO9	PO10	3	3

- This can be considered to be the relevance of each subject to the program outcomes (average of CO-PO matrix column).
- The above figure is from NBA e-SAR contains only course codes
- The detailed syllabus of the program should contain the PAM of the whole course in before detailed syllabus are provided.



Part-B

Attainment of Course Outcomes



Direct Attainment (Theory Papers)

- Attainment computation by direct methods is from marks obtained by students.
- Student assessment for theory subjects are of two types
 - ① Formative Assessment (Assignments, Quiz etc)
 - ② Summative Assessment (Mid Term, End Term exams)
- As per an earlier IQAC decision, VSSUT do not use the formative assessments for computing direct attainment.
- Therefore, the direct assessment of CO attainment is based on Mid Term and End Term marks only.



Should we include assignments etc for direct attainment?

- The logic behind excluding marks of assignment and quiz (as discussed in IQAC meetings) that
 - ① It will defeat the very purpose of such assignments which are only to build competency in students.
 - ② It is difficult to segregate CO-wise marks from various assignments and quizzes for all students.
 - ③ The 20 marks also include attendance. It is operationally difficult to calculate the student attendance by segregating classes to COs.
 - ④ If a student has completed the assignments for a particular CO, they must be able to perform well in MT/ET examinations.
 - ⑤ Thus the MT/ET exams implicitly measure the attainments of assignments.
- The only issue is that excluding the assignments causes the attainment to be a little pessimistic. Since, students are generally given good marks in assignments, it results in a higher numerical value of attainment.
- However, this can be taken care of by deciding the attainment level.



Step-1: Enter the Mid Term Marks in sheet 'MT'

B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
									Automatically Calculated						
		Course Outcome	CO1	CO2	CO3	CO1	CO2	CO3	CO1	CO2	CO3				
		Maximum Marks	2	2	2	8	8	8	10	10	10				
		Question No	1			2	3	4							
	Regd. No.	Name of the Student	a	b	c								SUM	Actual Marks	
1			2	2	0	6	3	6	8	5	6		19	19	
2			2	2	2	5	3	8	7	5	10		22	22	
3			2	2	2	8	8	7	10	10	9		29	29	
4			0	1	0	5	4	8	5	5	8		18	18	
5			2	2	0	6	4	8	8	6	8		22	22	
6			2	1	0	5	7	8	7	8	8		23	23	
7			2	2	0	6	6	7	8	8	7		23	23	
8			2	2	0	4	6	4	6	8	4		18	18	
9			2	1	0	6	8	8	8	9	8		25	25	
10			1	2	0	1	8	8	2	10	8		20	20	
11			2	2	0	7	8	6	9	10	6		25	25	
12			2	2	0	8	8	6	10	10	6		26	26	
13			2	2	0	1	8	5	3	10	5		18	18	
14			2	2	0	8	8	8	10	10	8		28	28	
15			1	2	0	8	6	3	9	8	3		20	20	
16			2	2	2	8	8	8	10	10	10		30	30	
17			2	2	0	6	4	8	8	6	8		22	22	
18			0	2	0	4	6	8	4	8	8		20	20	
19			0	0	0	4	3	2	4	3	2		9	9	
20			2	2	0	7	6	8	9	8	8		25	25	
21			2	2	0	5	8	8	7	10	8		25	25	
22			2	2	0	8	8	6	10	10	6		26	26	
23			2	2	0	6	7	8	8	9	8		25	25	
24			2	2	0	8	6	8	10	8	8		26	26	

- The yellow background columns are automatically calculated.
- Ensure that the SUM is equal to actual MT marks for each student.



Step-2: Enter the End Term Marks in sheet 'ET'

	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
7																					
8														These cells are automatically calculated							
9			Course Outcomes	CO1	CO2	CO3	CO4	CO5	CO1	CO2	CO3	CO4	CO5	CO1	CO2	CO3	CO4	CO5			
10			Maximum Marks	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
11			Question No	1					2	3	4	5	6								
12		Regd. No.	Name of the Student	a	b	c	d	e													
13	1			2	2	0	1	2	8	5	6	4	4	10	7	6	5	6		SUM	Actual Mark
14	2			2	1	1	1	3	3	5	4	3		5	4	6	5	4		34	34
15	3			2	2	2	0	0	8	7	7	0	0	10	9	9	0	0		24	24
16	4			2	1	0	1	0	4	4	10	4	4	6	5	10	5	4		28	28
17	5			2	2	2	1	2	8	7	6	5	5	10	9	8	6	7		30	30
18	6			2	2	1	1	2	8	6	7	6	6	10	8	8	7	8		40	40
19	7			1	1	1	1	0	7	2	6	6	4	8	3	7	7	4		41	41
20	8			2	2	0	0	2	7	7	5	4	6	9	9	5	4	8		29	29
21	9			1	2	2	1	2	8	8	7	3	5	9	10	9	4	7		35	35
22	10			1	2	1	1	1	2	6	7	0	2	3	8	8	1	3		39	39
23	11			1	1	0	1	1	6	7	7	6	5	7	8	7	7	6		23	23
24	12			2	2	1	0	1	6	6	6	3	7	8	8	7	3	8		35	35
25	13			1	1	0	1	0	4	4	4	4	2	5	5	4	5	2		34	31
26	14			2	2	2	1	2	8	7	8	8	8	10	9	10	9	10		21	21
27	15			1	0	0	0	1	4	4	5	4	4	5	4	5	4	5		48	48
28	16			1	2	2	1	0	7	6	8	4	3	8	8	10	5	3		23	23
29	17			2	2	0	0	2	7	7	6	4	6	9	9	6	4	8		34	34
30	18			2	2	0	0	2	8	6	7	3	6	10	8	7	3	8		36	36
31	19			1	0	0	0	2	6	3	5	2	2	7	3	5	2	4		36	36
32	20			0	1	0	0	1	4	4	7	1	5	4	5	7	1	6		21	21
33	21			1	2	0	0	0	7	6	7	0	6	8	8	7	0	6		23	23
34	22			1	2	1	0	1	4	4	6	0	7	5	6	7	0	8		29	29
35	23			1	2	0	0	0	6	5	5	5	0	7	7	5	5	0		26	26
36	24			0	1	0	1	1	8	5	6	4	5	8	6	6	5	6		24	24
																				31	31

- The yellow background columns are automatically calculated.
- Ensure that the SUM is equal to actual ET marks for each student.



Step-3: Define attainment levels

B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1															
2	Program														
3	Subject														
4	Semester														
5	Branch														
6	AY														
7															
8									0-3 scale	%					
9									Final Attainment	2.50	0.83				
10									Define Attainment Levels	0.5	0.3	Define attainment levels based on course performance			
11									Levels	3	2				
12															
13									Average attainment of Course Outcomes -->	2.76	2.78	2.73	2.00	2.24	
14									Percentage Attainment	Attainment in (0-3) scale					
15	Regd. No.	Name of the Student	CO1	CO2	CO3	CO4	CO5	CO1	CO2	CO3	CO4	CO5			
16	1		0.90	0.60	0.60	0.50	0.60	3	3	3	2	3			
17	2		0.60	0.45	0.80	0.50	0.40	3	2	3	2	2			
18	3		1.00	0.95	0.90	0.00	0.00	3	3	3	1	1			
19	4		0.55	0.50	0.90	0.50	0.40	3	2	3	2	2			
20	5		0.90	0.75	0.80	0.60	0.70	3	3	3	3	3			
21	6		0.85	0.80	0.80	0.70	0.80	3	3	3	3	3			
22	7		0.80	0.55	0.70	0.70	0.40	3	3	3	3	3			
23	8		0.75	0.85	0.45	0.40	0.80	3	3	2	2	3			
24	9		0.85	0.95	0.85	0.40	0.70	3	3	3	3	3			
25	10		0.25	0.90	0.80	0.10	0.30	1	3	3	1	1			
26	11		0.80	0.90	0.65	0.70	0.60	3	3	3	3	3			
27	12		0.90	0.90	0.65	0.30	0.80	3	3	3	1	3			
28	13		0.40	0.75	0.45	0.50	0.20	2	3	2	2	1			
29	14		1.00	0.95	0.90	0.90	1.00	3	3	3	3	3			
30	15		0.70	0.60	0.40	0.40	0.50	3	3	2	2	2			

- Copy student registration number and name from Mark Foils.
- Define attainment levels in cells J10, K10.
- Attainment levels should be **ratified by BoS** of the semester.



Final CO Attainment

D10		fx Σ = =0.7*B10+0.3*C10			
	A	B	C	D	E
1					
2		STEP-1	The Direct Attainment of CO is au		
3		STEP-2	Enter the Indirect Attainment of C		
4		STEP-3	Change the CO-PO mapping refer		
5		STEP-4	Change the Program Articulation		
6		STEP-5	If there is no mapping, 0 should l		
7					
8					PO Attainment
9		Direct	Indirect	Final CO	
10		2.50	2.91	2.63	CAM Row
11					



Indirect Attainment of Course Outcomes

- In the previous slide 2.50 is the direct attainment.
- The value 2.91 is obtained from **Indirect Attainment of Course Outcomes** by taking a survey from all students of the course.
- A format for indirect attainment of course outcomes is provided in the IQAC website (Please refer the next slide).
- Subject teachers should share the form with the students at the end of the semester and obtain average values of responses for each COs.
- The student should write (0/1/2/3) under the COs based on what he feels about his competency in the respective CO.
- Finally the average of CO1 column is the indirect attainment of CO1. Similar for other CO2, CO3, CO4 and CO5.
- The final value of indirect attainment of CO for the particular subject is = Average of CO1, CO2, CO3, CO4, CO5.



Format for Indirect Attainment of COs

SL. NO.	Regd. No.	CO1	CO2	CO3	CO4	CO5	Remarks
14	2102050016						
15	2102050017						
16	2102050018						
17	2102050019						
18	2102050020						
19	2102050021						
20	2102050024						
21	2102050026						
22	2102050027						
23	2102050028						
24	2102050029						
25	2102050030						
26	2102050031						
27	2102050032						
28	2102050033						
29	2102050034						
30	2102050035						
31	2102050036						
32	2203050001						
33	2203050002						
34	2203050003						
35	2203050004						
36	2203050005						



Direct CO Attainment for Lab (Continuous Evaluation)

		Continuous Evaluation											
							Automatically Calculated						
Course Outcome		CO1	CO2	CO3	CO4	CO5	CO1	CO2	CO3	CO4	CO5		
Maximum Marks		16	16	16	16	16	16	16	16	16	16	SUM	Continuous Evaluation
Question No													
Redg. No.	Name	a	b	c									
1		13	13	16	16	15	13	13	16	16	15	73	73
2		15	15	14	15	15	15	15	14	15	15	74	74
3		13	13	13	14	15	13	13	13	14	15	68	68
4		12	12	12	12	12	12	12	12	12	12	60	60
5		15	15	14	15	15	15	15	14	15	15	74	74
6		13	13	14	13	13	13	13	14	13	13	66	66
7		10	12	13	13	13	10	12	13	13	13	61	61
8		8	9	9	9	9	8	9	9	9	9	44	44
9		13	13	12	14	14	13	13	12	14	14	66	66
10		11	11	12	12	13	11	11	12	12	13	59	59
11		13	13	13	14	13	13	13	13	14	13	66	66
12		12	13	13	15	16	12	13	13	15	16	69	69
13		12	14	15	14	14	12	14	15	14	14	69	69
14		12	14	15	14	15	12	14	15	14	15	70	70
15		14	14	15	12	11	14	14	15	12	11	66	66
16		14	13	15	15	15	14	13	15	15	15	72	72
17		13	11	11	13	13	13	11	11	13	13	61	61

CON VIVA Attainment PO Attainment PSO Attainment Rubrics

- Continuous evaluation is of 80 marks.
- Each CO should ideally be assigned 16 marks.
- Students should be evaluated for each experiment.
- A CO can span multiple experiments.



Direct CO Attainment for Lab (End Evaluation)

END TERM EXAMINATION												
Course Outcomes					These cells are automatically calculated							
Maximum Marks	CO1	CO2	CO3	CO4	CO5	CO1	CO2	CO3	CO4	CO5		
Question No	4	4	4	4	4	4	4	4	4	4		
Regd. No.	Name										SUM	Viva/Test/Quiz
1	4	4	4	2	4	4	4	4	2	4	18	18
2	4	4	4	2	4	4	4	4	2	4	18	18
3	4	4	4	1	4	4	4	4	1	4	17	17
4	4	4	2	2	3	4	4	2	2	3	15	15
5	3	3	4	4	4	3	3	4	4	4	18	18
6	3	3	3	3	4	3	3	3	3	4	16	16
7	3	3	2	3	4	3	3	2	3	4	15	15
8	2	2	2	2	3	2	2	2	2	3	11	11
9	4	3	3	3	3	4	3	3	3	3	16	16
10	3	3	3	3	3	3	3	3	3	3	15	15
11	3	3	3	3	4	3	3	3	3	4	16	16
12	4	4	3	3	3	4	4	3	3	3	17	17
13	4	4	3	3	3	4	4	3	3	3	17	17
14	4	4	3	3	3	4	4	3	3	3	17	17
15	2	2	4	4	4	2	2	4	4	4	16	16
16	4	4	3	3	4	4	4	3	3	4	18	18
17	2	2	3	4	4	2	2	3	4	4	15	15
18	2	2	2	2	3	2	2	2	2	3	11	11
19	3	3	3	3	4	3	3	3	3	4	16	16
20	3	3	3	3	4	3	3	3	3	4	16	16

CON VIVA Attainment PO Attainment PSO Attainment Rubrics

- End evaluation is of 20 marks (Test/Viva/Quiz).
- Each CO should ideally be assigned 4 marks.
- Students should be evaluated for each CO.



Final CO Attainment for Lab

fx Σ = =0.7*B10+0.3*C10

B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
STEP-1	The Direct Attainment of CO is automatically copied, else enter the value in B10														
STEP-2	Enter the Indirect Attainment of CO in C10 (This is obtained from survey on COs at the end of semester)														
STEP-3	Change the CO-PO mapping referring to syllabus														
STEP-4	Change the Program Articulation Matrix (PAM) row referring to syllabus. This is the average mapping of COs														
STEP-5	If there is no mapping, 0 should be replaced by -														
			PO Attainment												
				2.80	2.80	1.86	0.93	2.80	1.86	0.93	0.93	2.80	2.80	0.93	0.93
Direct	Indirect	Final		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
2.73	2.94	2.80	CAM Row	3	3	2	1	3	2	1	1	3	3	1	1
			CO-PO Mapping												
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
			CO1	3	3	2	1	3	2	1	1	3	3	1	1
			CO2	3	3	2	1	3	2	1	1	3	3	1	1
			CO3	3	3	2	1	3	2	1	1	3	3	1	1
			CO4	3	3	2	1	3	2	1	1	3	3	1	1
			CO5	3	3	2	1	3	2	1	1	3	3	1	1

CON VIVA Attainment **PO Attainment** PSO Attainment Rubrics

- Final CO attainment = $0.7 * Direct + 0.3 * Indirect$.
- Indirect attainment is by survey similar to theory subjects.



Part-C

Attainment of Program Outcomes



PO Attainment Method-1

- As per the NBA portal requirements, the PO attainment for each subject is required to be uploaded.
- In the excel formats PO attainment is computed using the formula

$$\text{Final CO Attainment} \times \frac{\text{Average Mapping for that PO}}{3} \quad (1)$$

- Please refer the next slide for detailed formula.
- **Problems with this approach**

- 1 Any CO-PO mapping which is less than 1 or 2 will results in lower PO attainment even if the CO attainment is very high.
 - 2 This method implicitly discourages actual CO-PO mapping.
 - 3 PO attainment ideally should be of a particular batch and not for a particular subject.
- The NBA portal averages the PO attainment of each subject to get the final PO attainment. Hence, 1/2 mapping lowers the attainment



PO Attainment Method-1 (cont.)

			PO Attainment	2.63	2.63	1.75	0.88	0.88	1.75	0.88	0.00	0.00	0.00	0.00	0.88
Direct	Indirect	Final CO	PAM Row	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
2.50	2.91	2.63		3	3	2	1	1	2	1	0	0	0	0	1
			CO-PO Mapping												
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
			CO1	3	3	2	1	1	2	1	-	-	-	-	1
			CO2	3	3	2	1	1	2	1	-	-	-	-	1
			CO3	3	3	2	1	1	2	1	-	-	-	-	1
			CO4	3	3	2	1	1	2	1	-	-	-	-	1
			CO5	3	3	2	1	1	2	1	-	-	-	-	1

- The final CO value to be used (NOT direct/indirect)
- When there is no mapping, keep it blank in the NBA portal.
- Note the lower value of PO attainment when the mapping is < 3 .



Method-2

- This method was originally planned to be used in VSSUT in 2019.
- This provides the direct attainment of POs batchwise.
- For example, consider the graduating batch of 2023.
 - ① For first year, the CO attainment of 2019-20 to be used.
 - ② For second year, the CO attainment of 2020-21 to be used.
 - ③ For third year, the CO attainment of 2021-22 to be used.
 - ④ For final year, the CO attainment of 2022-23 to be used.
- Working formula (Detailed excel format uploaded in website).

$$\text{Final CO} \times \frac{\text{CO-PO mapping for that subject only}}{\text{Sum of mapping for all subjects for that PO}} \quad (2)$$

- Please refer the next slide for details.
- The disadvantages of this method is that the individual contribution of subjects for final PO is not in 1-3 scale.
- However, PO attainment obtained using this method must be available in file, because this seems to be the accurate way.



PO Attainment Method-2 (cont.)

fx Σ = =F6*\$PAM.G6/\$PAM.\$G\$73

E	F	G	H	I	J	K	L	M	N	O	P	Q	R
		2.524	2.514	2.513	2.534	2.588	2.541	2.535	2.597	2.645	2.621	2.577	2.548
Code	Final CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BMA2101	2.31	0.041	0.048	0.057	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.038
BPH2101	2.41	0.042	0.051	0.059	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.040
BEE2101	2.12	0.037	0.030	0.017	0.049	0.022	0.038	0.067	0.108	0.047	0.095	0.053	0.052
BCS2101	2.56	0.045	0.054	0.063	0.039	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.042
BCE2101	2.83	0.033	0.020	0.023	0.044	0.000	0.152	0.135	0.048	0.031	0.042	0.071	0.070
BPH2191	2.73	0.016	0.019	0.022	0.042	0.028	0.000	0.000	0.046	0.090	0.041	0.034	0.022
BEE2191	2.82	0.049	0.059	0.023	0.022	0.058	0.101	0.134	0.143	0.062	0.084	0.071	0.069
BME2191	2.72	0.016	0.019	0.022	0.042	0.083	0.000	0.000	0.046	0.090	0.041	0.034	0.022
BCS2191	2.81	0.016	0.020	0.023	0.043	0.057	0.000	0.000	0.048	0.093	0.042	0.035	0.023
BMA2201	2.43	0.043	0.051	0.060	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.040
BCH2101	2.14	0.038	0.045	0.053	0.049	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.035
BEC2101	2.59	0.045	0.036	0.021	0.060	0.026	0.046	0.082	0.132	0.057	0.116	0.065	0.064
BCS2101	2.37	0.042	0.033	0.019	0.055	0.024	0.042	0.075	0.121	0.052	0.106	0.059	0.058
BHU2101	2.67	0.000	0.000	0.000	0.000	0.027	0.048	0.085	0.045	0.029	0.120	0.100	0.066
BCH2191	2.75	0.016	0.019	0.023	0.042	0.028	0.000	0.000	0.047	0.091	0.041	0.034	0.023
BEC2191	2.81	0.049	0.059	0.023	0.022	0.057	0.100	0.134	0.143	0.062	0.084	0.070	0.069
BCE2191	2.86	0.033	0.040	0.047	0.044	0.029	0.000	0.000	0.048	0.094	0.128	0.036	0.023
BHU2191	2.93	0.000	0.000	0.000	0.000	0.030	0.052	0.093	0.050	0.032	0.131	0.110	0.072
BMA1301	2.27	0.040	0.048	0.056	0.052	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.037
BEE1302	2.26	0.040	0.032	0.019	0.000	0.046	0.040	0.000	0.000	0.025	0.000	0.000	0.037
BEE1303	2.16	0.038	0.045	0.018	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.035
BME1303	2.18	0.038	0.046	0.054	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.036
BHU2302	2.06	0.012	0.014	0.017	0.016	0.021	0.074	0.098	0.070	0.045	0.061	0.077	0.017
BEE1392	2.91	0.051	0.020	0.024	0.067	0.059	0.000	0.000	0.000	0.064	0.043	0.036	0.024

Navigation icons: Home, Back, Forward, Refresh, Print, Save, Undo, Redo, Zoom, Search, Help.



PO Attainment (Indirect)

- The indirect assessment of PO attainment is obtained using Surveys.
- In 2019 Curriculum workshop, it was decided to use only the above three surveys for indirect assessment of PO attainment.
 - 1 Student Exit Survey
 - 2 Employer Survey
 - 3 Alumni Survey
- **Student Exit Survey** is collected by IQAC during the month of May after the final exams and over, but result is not out.
- **Employer Survey** is conducted by Training & Placement department both online and offline every academic year.
- **Alumni Survey** is conducted by departments from various Alumni meets and events or by direct contact with alumni.



Final PO Attainment

Method	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Direct	2.52	2.51	2.51	2.53	2.59	2.54	2.53	2.60	2.65	2.62	2.58	2.55
Exit Survey	2.71	2.87	2.65	2.91	2.74	2.35	2.87	2.33	2.73	2.78	2.46	2.76
Alumni Survey	2.57	2.69	2.14	2.67	2.84	2.94	2.87	2.39	2.54	2.56	2.87	2.31
Employer Survey	2.47	2.54	2.68	2.57	2.64	2.78	2.43	2.62	2.67	2.39	2.76	2.41
Final Attainment	2.57	2.65	2.50	2.67	2.70	2.65	2.68	2.48	2.65	2.59	2.67	2.51
Final Attainment (%)	85.62	88.45	83.19	89.03	90.07	88.43	89.21	82.81	88.21	86.26	88.89	83.56

- Please note that the averaging is done by the NBA portal.
- We need to enter the summary of various surveys only.
- The direct attainment is average of all subjects.
- Please ensure that the values available in NBA files **match with the attainment levels** in the NBA portal.



- The document **Course File** contains the detailed steps of the Course Planning, Delivery and Evaluation.
- Group-1 (Course Planning)
 - 1 Vision and Mission (Institute and Department)
 - 2 Program Educational Objectives (PEOs)
 - 3 PEO-Mission Mapping (Mission of Dept.)
 - 4 Program Outcomes (PO); Program Specific Outcomes (PSOs)
 - 5 Detailed Curriculum and Course Outcomes (COs)
 - 6 Course Articulation Matrix (CO-PO mapping);
 - 7 Program Articulation Matrix (Subject-PO mapping).
- Group-2 (Course Delivery)
 - 1 Class Time Table
 - 2 Attendance Sheets
 - 3 Lesson Plan
 - 4 Class Diary
 - 5 Assignment Questions
 - 6 Quiz Questions



- Group-3 (Evaluation)
 - ① Rubrics for this course
 - ② Sample Assignments/Lab records
 - ③ Survey responses for Indirect Assessment of COs
 - ④ Print of 'Attainment' sheet of CO evaluation excel.
 - ⑤ Print of Gradesheets
 - ⑥ Result Analysis
- Ideally, a every unique subject should have a unique course file.
- Since there is a risk of documents being lost. Therefore, VSSUT maintains Course Files by the Instructors.
- Course files for **Project-I, Project-II, Seminar** etc should be maintained at program/department level with detailed Rubrics.
- Course Files for Laboratory, ideally, should be available in the concerned labs organized by the Lab-in-charge and Instructor-in-charge.



A case for Automation

- Provision can be made for submitting Course outcome attainments (direct and indirect) along with semester marks.
- Program Articulation Matrix (Subject-PO mapping OR the average of CO-PO mapping) should be part of the software.
- Using the PAM, subject wise PO attainment is obtained at the time of publication of results.



Thank You

