

Study on Attainment of Course Outcome For Diploma Program

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Abstract- National Board of Accreditation (NBA) is outcome based learning education. Faculty has to assess the CO and PO attainment using some direct and indirect methods.

Criterion 3 assesses the attainment of program outcomes (POs) through attainment of course outcomes (COs). Different methods have been adopted by Diploma Engineering Institutions for the measurement of attainment of COs and PO. This paper aims to provide the method for attainment of course outcome for Engineering Diploma Program as defined by National Board of Accreditation (NBA).

Keywords- COs -Course Outcomes, POs- Program Outcome, Rubrics, Student Analysis, CO-PO Mapping, CO Attainment and PO Attainment.

I. INTRODUCTION

The Mechanical Engineering Diploma program syllabus is designed by Maharashtra State Board of Technical Education (MSBTE) Mumbai for students which consist of different courses (subjects). The Diploma program is completed in 3 years and examination pattern is semester-wise. All Courses have its own objective and methodology to achieve the Course Outcomes. Some courses have theory with practical and some have only theory. Course teacher make course outcomes as per syllabus. Course outcomes are the statements indicating about what student will be able to do after studying that topic at the time of completion of a course. The attainment is assessed for Course learning outcomes at the time of internal assessments and Semester examination, Program outcomes are assessed at the time of completion of graduation. Outcome-based education focuses every part of the educational system around goals or outcomes. As the term used is outcome, it should be accessed through the specified parameters. So, the evaluation of outcome of the program should be the overall measure of knowledge, skill, attitude as well as Proficiency towards the attainment of the goal upon completion of a program. Once the course outcomes are defined then CO-PO mapping matrices are formed. This matrix is prepared by judgment of comparison between each CO & each PO statements. This mapping matrix is further

used for PO attainment. With the help of this CO-PO mapping matrix we get the Target level for each PO and then PO attainment is assessed by various methods like delivering the content through conventional and/or active

Learning methodologies which can be adopted based as per the requirements. Some of the conventional methodologies are power point presentation, assignment, seminar, case study, guest lecture, and workshop. etc., and few of the active methodologies are role play, quiz, brain storming, group discussion, implementing mini projects, industrial visit, in plant training, value added course(s).

1.1 CO-PO Mapping:

Course Outcomes are narrower statements that describe what students are expected to know, and be able to do at the end of each course. These relate to the skills, knowledge, and behavior that students acquire in their enrolment through the course.

Table 1.1(1): Course Outcomes

Course Name: Engineering Metrology

Course Code: 22342

At the end of this course, the student will be able to:

C 305-1	Select the relevant instrument for measurement
C 305-2	Use different types of comparators
C 305-3	Select gauges, fits and tolerance for machine components
C 305-4	Use relevant instrument to measure different parameters of screw thread and gears
C 305-5	Use linear and angular measuring instruments
C 305-6	Select relevant surface testing methods

C 305-1 means: 3rd semester, 5th course in teaching scheme and -1 is first course outcome for 1st topic

Table 1.1. (2): Mapping of Course Outcomes with Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
C305-1	3	2	—	2	1	1	—	1	—	1
C305-2	2	2	2	3	1	—	—	1	—	—
C305-3	2	1	2	2	—	—	1	1	1	1
C305-4	2	2	2	1	—	—	—	2	1	—
C305-5	1	1	3	3	—	—	—	2	—	—
C305-6	2	2	3	3	—	—	1	—	—	—
AVERAGE	2	1.67	2.4	2.33	1	1	1	1.4	1	1

The CO-PO mapping has been done with correlation levels 1, 2, 3 and “--” for no correlation as defined below:

1. Slightly (Low)
2. Moderately (Medium)
3. Substantially (High)

1.2 Program Level Matrix:

From the mapping matrix of COs and POs for all the courses as above, a ‘Program level Course-PO matrix’ of all the courses including first year courses is prepared. For this matrix the average of respective PO are taken with respect to each CO of a course.

Table 1.2: Program level Course-PO matrix for all the courses including first year courses

COURSE	SUBJECT	SUBJECT CODE	CO's	PROGRAM OUTCOME (PO)									
				PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
ME1G	Basic Science	17102	C102	2.6	2	2	2	2.6	-	-	-	-	-
ME1G	Basic Workshop	17006	C107	2.5	2	2	2.2	-	-	2	-	-	-
ME2G	Engineering Mechanics	17204	C204	2.1	1.6	1	2	2.17	-	-	1.6	-	-
ME2G	Engineering Drawing	17205	C205	1.6	2	-	1	2	-	1.5	1	1	-
ME3G	Applied Mathematics	17301	C301	1.6	1.5	1	-	1.33	-	-	1	-	-
ME3G	BEM	17302	C302	1.1	1.2	1	1	2	-	1	2	-	-
ME4G	Theory of Machines	17412	C406	-	1.8	1.37	1	2.12	-	-	-	-	-
ME4G	Professional Practices-II	17035	C407	2.0	2.3	3	-	2	1.5	2.25	1.7	1.7	1.5

II. ATTAINMENT OF COS

2.1 Assessment Process:

Course Outcomes are narrower statements that describe what students are expected to know, and be able to do at the end of each course. These relate to the skills, knowledge, and behavior that students acquire in their matriculation through the course [1].

Attainment is the action or fact of achieving a standard result towards accomplishment of desired goals. Primarily attainment is the standard of academic attainment as observed by test and/or examination result [3].

For direct attainment the progressive test result, MSBTE result is taken into consideration.

Progressive Test:

Two progressive tests are conducted in each semester – one in the mid-semester and the other at the end of semester. MSBTE provides teachers guide for all subjects. It includes lecture-wise topics

Teachers guide also includes sample question papers as guide lines for setting question paper for progressive tests.

Course outcome of the subject are taken into consideration while setting up the question paper.

After paper assessment the attainment of course outcome is found by determining the number of students having met the set standard in the said subject.

Based on the above calculation the attainment level is found.

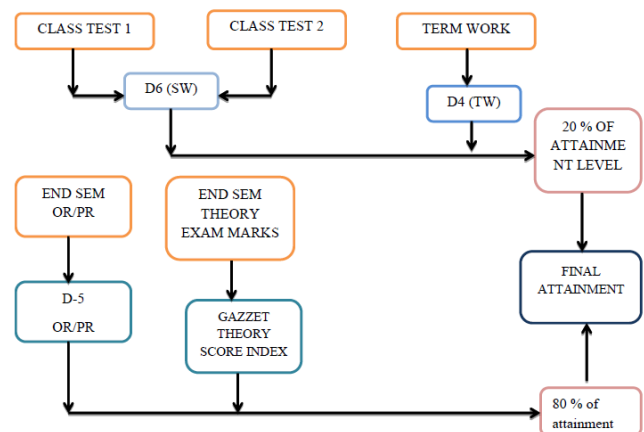
MSBTE Exam:

MSBTE provides teaching scheme for every semester, which includes the components viz

Theory Exam, Practical/Oral exam and term work along with the maximum marks allotted for each component.

The marks of the applicable components are added and attainment of course outcome is found by determining the number of students who have met the set standard in the said subject.

The direct attainment is calculated by taking into consideration the 20% of allotment level for class test & TW and 80% of allotment for MSBTE exam / OR PR.

**Chart 2.1: Attainment of CO**

2.2 Record the Attainment:

Program has set course outcome attainment level for all courses. To measure course outcome attained through board examination target level is stated as percentage of students getting more than the level selected by program.

Average marks selected by the Program = 40% of total mark to assess a course.

Direct assessment method and indirect assessment method are considered for 80% and 20% weightages respectively.

Direct assessment method: Class test 1 & 2, Internal TW, Internal OR/PR

Indirect assessment method: MSBTE board examination marks, External OR/PR

Table 2.2(1): CO Target level

Attainment Level	Target Level
Attainment Level 1	up to 45% students scoring more than average percentage marks
Attainment Level 2	45% to 50% students scoring more than average percentage marks
Attainment Level 3	above 50% students scoring more than average percentage marks

For the Above table calculation of attainment level for three years has been done. It was observed that with the set standard of 40% the achieved level was higher than the target level.

Table 2.2(2): CO Internal Assessment

Attainment (Internal) 2017-18 ME5G			MAN		IFP			PER	
SR. NO.	Enrollment No.	Student Name	T1	T2	T1	T2	TW	T1	T2
1	1310950269	BANSODE MANOJ RAJKUMAR	7	8	18	10	22	10	19
2	1310950270	KAMBLE PRASHANT BALIRAM	17	15	17	12	23	16	21
3	1310950298	DONGARE BASWESHVAR BALIRAM	10	11	18	10	22	6	13
4	1310950314	PATIL PRASHANT VENKATRAO	10	8	18	13	23	11	21
No. Of Students reached target level			42		51			53	
% of students Attained target			76.36		92.72			96.36	
Attainment level			3		3			3	

Like-wise for all courses the class test 1 & 2, TW marks of students in class are noted in similar table to make internal assessment. We have set the target level marks of 40 % for class test and 50 % for TW. If a student scores above these target level then only he is counted for attainment. Percentage of students reached target level is found and according to that attainment level for a course is given.

Table 2.2(3): CO External Assessment

Attainment (External) 2017-18 ME5G			AEN	AMP	MAC	PEN		MQC	
SR. NO.	Enrollment No.	Student Name	TH TSI (53.86)	TH TSI (51.64)	TH TSI (47.96)	PR	TH TSI (50.61)	PR	TH TSI 46.65
1	1510950098	PATIL SHRIPAD KASHINATH	63	58	63	23	61	22	78
2	1510950100	BALKUNDE PRATIK PARMESHWAR	61	65	54	23	57	22	43
3	1510950103	KANGUDE VAISHNAV SAUDAGAR	84	88	82	24	80	24	81
4	1510950106	PATIL AKASH MANOJ	67	63	59	23	71	23	47
No. Of Students reached target level			41	41	46	37		21	
% of students Attained target			74.54	74.54	83.63	67.27		38.18	
Attainment level			3	3	3	3		1	

In this method final board examination marks of students are compared with TSI (Theory Score Index) given by MSBTE. If a student score marks above TSI score then only he is counted for attainment. Also external OR/PR marks are compared with target of 50% marks. If a student score satisfying both target level then only he is counted to find percentage of CO attainment.

2.3 Overall Course Outcome Attainment:

CO Attainment = 80 % External Assessment + 20 % Internal Assessment

(Boardexam, external OR/PR) (Class test 1 & 2, TW)

S.N	COURSE	CLASS	COURS E NAME	COURSE CODE	BOARD EXAM Assessment. (TH+OR/PR)	Attainment level	INTERNAL Assessment (TW+UT)	Attainmen t level	FINAL Attainment (80%+20%)
1	C 101	MEH	ENG	22101	43	1	75.47	3	0.6
2	C 102	MEH	BSC	22102	43	1	92.43	3	0.6
3	C 303	ME3G	MED	17303	60.23	3	51.28	2	2.8
4	C 306	ME3G	CAD	17016	98.71	3	98.71	3	3
5	C 403	ME4G	EEN	17404	46.57	1	65.75	3	1.4
6	C 404	ME4G	TEN	17410	50.68	2	61.64	3	2.2
7	C 503	ME5G	MAC	17528	83.63	3	76.36	3	3
8	C 504	ME5G	PEN	17529	67.27	3	78.18	3	3
9	C 602	ME6G	IFP	17608	85.45	3	92.72	3	3
10	C 603	ME6G	PER	17609	49.09	2	96.36	3	2.2

Percentage of students who have scored above target levels for board examination, class test 1 & 2, oral / practical marks are found and according to it attainment level is given for each course.

Final Course outcome attainment is calculated as 80 % of external assessment + 20 % of internal assessment.

III. CONCLUSION

In this paper, detailed method and various techniques of assessing CO attainment is given for Diploma Engineering program. This paper provides an attainment method which is prepared in line with the guidelines indicated by NBA. The direct attainment is carried out for a particular course from internal and external exam results. The indirect attainment calculation is also carried out using various surveys. This analysis will help the faculty to plan new strategy for delivery,

assessment and students involvement in learning for improvement in ensuing semester. In this way, OBE helps in identifying the gaps in the curriculum to meet the learning objectives to suit the industry requirements.

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