Government Polytechnic Mumbai

Curriculum Philosophy

(P16 Outcome based Curriculum)

Preface

The quality of technical education is dependent on a well-developed curriculum. The curriculum should not focus only on technical contents but it should impart necessary skills that help students to learn how to cope with new challenges. It should prepare them for lifelong learning once they enter the workforce. It is very necessary that the diploma students should be well updated with the latest technological skills and advancements, to meet industrial demands and contribute to nation building. With this thought we have designed outcome based curriculum keeping in view the latest industry trends and market requirements. Outcome based curriculum will be offered to students 2016 onwards. Outcome based curriculum is student centric rather than teacher centric. It is comprising of basic science and engineering having focus on fundamentals, significant discipline level courses and electives. Inplant training is also included in the curriculum to make the student understand industry requirements, have hands on experience and take up project work relative to industry in their final year. These features will allow the students to develop problem solving approach to face the challenges in real life.

In outcome based education, Programme Outcomes, Programme specific outcomes, Course outcomes are defined first and then course contents are designed to achieve these outcomes. During curriculum implementation the teacher will analyze the contents and then develop the learning experiences which will ensure accomplishment of outcome. The industry experts, being main stake holders are actively involved, while designing the curriculum. Outcomes are validated by industry experts, so it will produce industry ready pass outs and increase the employability of students.

Salient features of this curriculum are

- Outcome based curriculum with well defined outcomes for each course
- Incorporation of Inplant training
- Built in flexibility to the students in terms of elective courses
- Course on Entrepreneurship to encourage entrepreneurial skills
- More weightage for practical's in terms of contact hours to increase skill component
- Introduction of Yoga in first semester to inculcate the habit of physical and mental fitness right at the start

- Introduction of Social work in first semester to inculcate social awareness and values
- Introduction of Spoken Tutorial course in order to inculcate self learning capability in students.
- A list of experiments with clear outcomes.

The New Curriculum has been designed to better meet the needs of the industry considering evolving technological trends and implications for the engineering workforce. This curriculum is also expected to enhance employability skills and develop well trained Diploma Engineers who have the knowledge and the skills to get engineering solutions for real-world problems.

I gratefully acknowledge the time and efforts of all those who contributed to design the curriculum, especially the contributions of chairperson and members of Board of Studies and Programmewise Board of Studies. I acknowledge all the stake holders, aluminies and subject experts.

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Outcome Based Education Philosophy

As the National Board of Accreditation (NBA) is focusing on the adoption of Outcome Based Education (OBE) approach, Government Polytechnic, Mumbai has adopted the OBE approach for design of curriculum P16 to all programmes. NBA adopted Outcome based Model because, OBE is "Student Centric" rather than "Teacher Centric". OBE focuses on the graduate attributes or outcomes after completing an academic programme. Outcome based approach means knowing what you want to achieve and then taking the steps to do so. Starting with a clear picture of what is important for students to be able to do and then organizing the curriculum delivery and assessment to make sure learning happens.

Some Benefits of OBE are

1. Satisfying the need of stake holders
2. More specific and coherent curriculum
3. Student centric

Components of the OBE are

1. Outcome based curriculum: What students should be able to do after learning the curriculum?
2. Outcome based Teaching Learning: Prepare and train the students to achieve the outcomes.
3. Outcome based assessment: Measure what the student has achieved? Indentify which outcome has not attained by the students.
4. Remedial measures: Take the remedial measures so that student can achieve that outcome.

Fig1. Outcome Based Education Philosophy

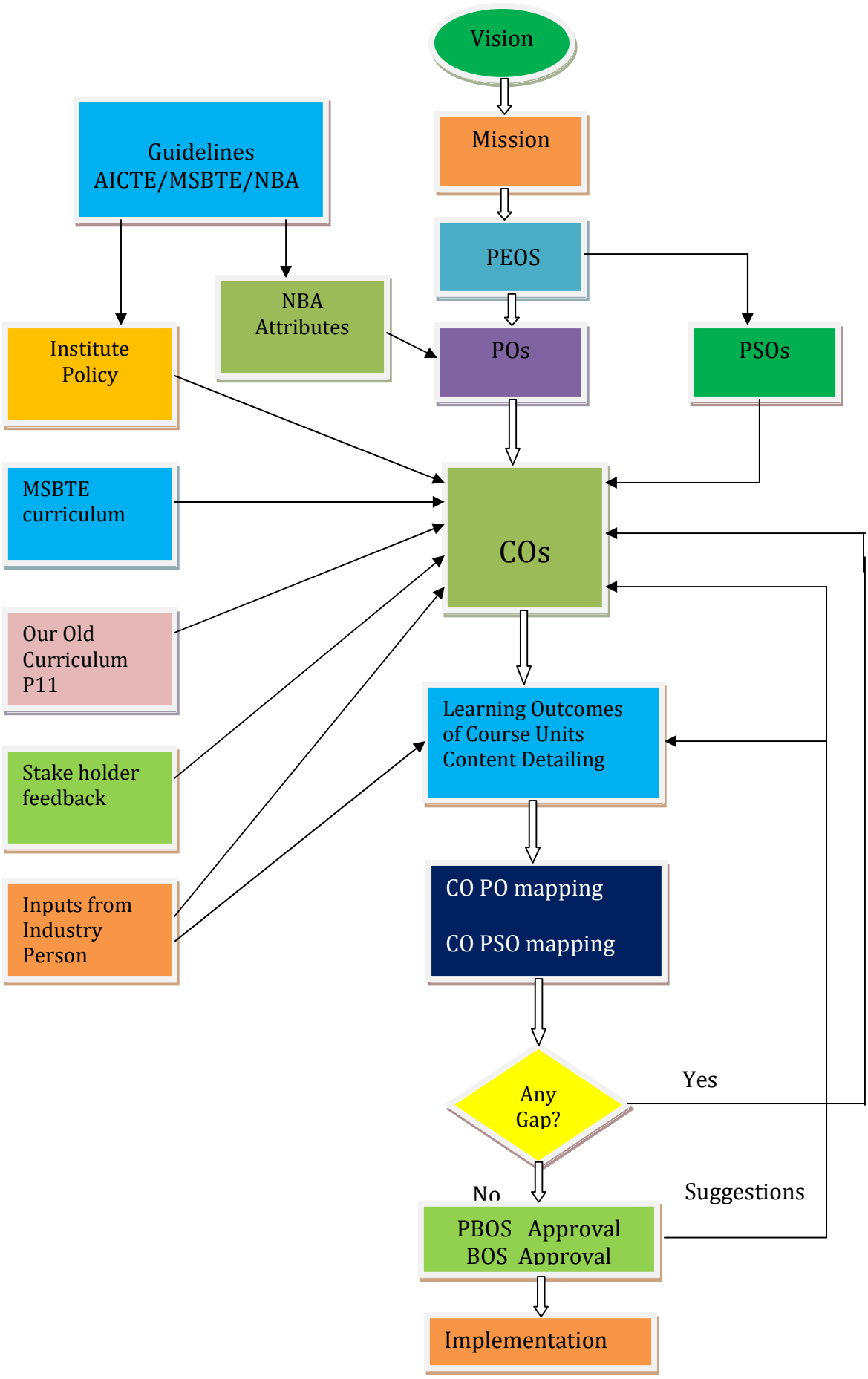

Fig. 2 Curriculum Design Process

Figure 1 shows outcome based education philosophy. Vision and mission statements will be finalized first, and then each programme will finalize Programme educational objectives (PEOs). Programme outcomes (POs) are given by NBA. Each programme will finalize their Programme Specific Outcomes (PSOs). Then course outcomes (COs) are finalized and then content detailing of each course will be carried out.

Figure 2 shows our curriculum design process/philosophy. Figure is self explanatory. Important steps are given below. Process starts with formulation of vision mission statements of the institute.

1. Formulation of Vision Mission Statements

Vision Mission statements of the institute are finalized using following steps.

- Bottoms up approach
- Involvement all stakeholders
- Discussion, Brain storming sessions among all stake holders
- Gap analysis or SWOT analysis
- Challenges before the institute
- What are the immediate and long term goals

After following these steps vision and mission statements of the institute is finalized as

Institute Vision

Transform Knowledge into Work

Institute Mission

We are committed for

- Quality education for lifelong learning
- Need based educational programmes through different modes.
- Outcome based curriculum implementation
- Development and up gradation of standard laboratory practices
- Promoting entrepreneurial programmes

We believe in ethical, safety, environmental friendly practices and teaching learning innovations.

Once, the vision mission statements are finalized. Using the same procedure vision mission statements of each programmes are finalized.

2. Programme Educational Objectives (PEOs)

The Programme educational objectives of a diploma program are the statements that describe the expected achievements of diploma holders in their career, and also in particular, what they are expected to perform and achieve during the first few years after diploma. The PEOs, may be guided by global and local needs, vision of the Institution, long term goals etc. For defining the PEOs the faculty members of the program have continuously worked with all Stakeholders: Local Employers, Industry, Students and the Alumni

3. Programme Outcomes (POs)

Programme outcomes are given by NBA. They are

1. **Basic knowledge:** An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems.
2. **Discipline knowledge**: An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.
3. **Experiments and practice:** An ability to plan and perform experiments and practices and to use the results to solve engineering problems.
4. **Engineering Tools**: Apply appropriate technologies and tools with an understanding of the limitations.
5. **The engineer and society**: Demonstrate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.
6. **Environment and sustainability**: Understand the impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
7. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
8. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.
9. **Communication:** An ability to communicate effectively.

10. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

4. Programme Specific Outcomes (PSOs)

These outcomes are specific to a program in addition to NBA defined POs, namely, Civil, Computer, Electrical, Electronics, Mechanical, Information Technology, Instrumentation, Rubber Technology, Leather Technology, and Leather Goods and Footwear technology.

5. Course Outcomes (COs) and Content detailing

"Statements of observable student actions that serve as evidence of the Knowledge, Skills and Attitudes acquired in a course". Each course is designed to meet (about 4 to 6) Course Outcomes The Course Outcomes are stated in such a way that they can be actually measured. "Blooms Taxonomy" is used for framing course outcomes.

Course Outcome statements are broken down into two main components:

- **An action word** that identifies the performance to be demonstrated;
- **Learning statement** that specifies what learning will be demonstrated in the performance;

Once the COs are finalized, content detailing of each course is done as per the course outcomes. For content detailing inputs are taken from stake holders, MSBTE curriculum and industry persons.

6. CO-PO and CO-PSO mapping

When all COs are finalized, COs are mapped with POs and PSOs. During mapping if it is found that particular PO or PSO has not been addressed by any CO, then it is considered as gap. To remove this gap, again COs are modified. This process will repeat till all POs and PSOs are mapped by COs.

7. Approval in PBOS and BOS meetings.

After CO-PO and CO-PSO mapping, content detailing is done. Then the curriculum is kept for approval in Programme wise Board of studies (PBOS) meeting. Each programme has its own PBOS committee whose structure is as follows.

Head of Department concerned	Chairman
Two senior Lecturers	Members
One expert from the neighboring institute	Member

Nominee from the board of technical Education	Member
One expert from the local industry	Member
Departmental Curriculum Coordinator	Member Secretary

Suggestions given by PBOS members are incorporated in the curriculum and then it is put in front of Board of studies (BOS). Structure of BOS is as follows.

Representative from Industry	Chairman
Principal	Member
Head of All departments	Member
Local Experts of all programmes	Member
Nominee from the board of technical Education	Member
In charge CDC / Academic Coordinator	Member Secretary

Suggestions given by BOS members are incorporated in the curriculum and the finalized curriculum is then offered to the students.

8. Institute Policies

As per the guidelines given by All India Council of Technical Education (AICTE), Maharashtra State Board of Technical Education (MSBTE), Directorate of Technical Education (DTE) and NBA, Institute policies about curriculum design are decided in the meeting of all Heads of the departments.

Being an autonomous institute, we revise our curriculum after every 4 to 5 years. Earlier it was revised in 2011. Curriculum 2011 was objective based curriculum. As per instructions received from AICTE and NBA, **Outcome based curriculum** should be offered to students, we have decided to offer **Outcome based curriculum** in 2016. In 2016 it will be offered to first year and in subsequent years it will be offered to second year and third year. Once the curriculum frame work is finalized at the institute level, as per the demand of the industry, course contents can be changed at any level without disturbing the frame work. This is necessary to satisfy the present demand of the industry and remove the curricula gaps as per the advancement in technology.

2011 curriculum was of 180 credits. But as per AICTE norms given in APH 2015-16, contact hours per semester should be 525 hours and number of teaching days should be 75 in a semester (7 hours per day i.e. 35 hours per week). Diploma is of 3 years (6 semesters). (35 x 6 = 210).

So we decided to design 2016 curriculum with 200 credits + 10 non credit courses.

Definition of Credit:

1 Hr. Lecture (L) per week 1 credit

1 Hr. Tutorial (T) per week 1 credit

2 Hours Practical (P) per week 2 credit

Civil Engineering, Mechanical Engineering, Rubber Technology, Leather Technology, Leather Goods and Footwear Technology departments are incorporating Inplant training in their curriculum, wherein students will go for Inplant training in the industries during last semester. So their credits will be 190 credits + 10 non credit courses.

For rest of the branches 6 weeks Inplant training is incorporated in the curriculum. 4 week training will be performed after 4th semester during summer vacation and 2 week training will be performed after 5th semester during winter vacation. So their credits will be 200 credits + 10 non credit courses. Credit distribution of both cases is given below.

Curriculum Frame work for (CO, IT, EC, EE, IS)

Year	**Semester**	**Credits**	**Total Credits Year wise**	**Total credits**
First	**First**	30	60	200
	Second	30		
Second	**Third**	35	70	
	Fourth	35		
Third	**Fifth**	35	70	
	Sixth	35		

Curriculum Frame work for (CE, ME, RT, LT, LGFT)

Year	**Semester**	**Credits**	**Total Credits Year wise**	**Total credits**
First	**First**	30	65	190
	Second	35		
Second	**Third**	35	70	
	Fourth	35		
Third	**Fifth**	35	55	
	Sixth	20		

Social-emotional learning develops **5 core competencies** in students: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. Yoga and meditation foster these core competencies. Through a yoga and meditation practice, students first

learn to bring awareness to their breath and physical body. By focusing on this connection, student become more able to feel and experience what is happening within the mind and bodies, developing stronger self-awareness. With this thought we have decided to incorporate "Yoga" as a non credit course in first semester for all programmes.

To Inculcate Social awareness, values and environmentally responsible behavior amongst students and to nurture students as citizens with moral, ethical and social values so as to provide service to the society through activities and discharge their obligations towards the society, we decided to incorporate "Social Work" as a non credit course in first semester for all programmes.

First year, first semester of all programmes is of 30 credits, so 5 hrs non credit non exam courses are incorporated in curriculum of all programmes as shown below.

Semester	Courses	Hours	Total hours
First Semester	Yoga	2 Hrs	5 Hrs
	Social work	3 Hrs	

In order to inculcate self learning capability in students "Spoken Tutorial" course is incorporated in the curriculum of second semester of CO, IT, EC, EE, IS. Similarly to create awareness about Digital India, a course "Digital India" is incorporated in curriculum of second semester of CO, IT, EC, EE, IS.

First year, second semester of CO, IT, EC, EE, IS programmes is of 30 credits, so 5 hrs non credit non exam courses are incorporated in curriculum of these programmes as shown below.

Semester	Courses	Hours	Total hours
Second Semester	Spoken Tutorial	2 Hrs	5 Hrs
	Digital India	3 Hrs.	

For all courses 70+30 pattern of examination is followed instead of 80+20. Two internal progressive assessment tests are conducted for theory courses in a semester having maximum marks 30. End semester examination of 70 Marks is conducted at the end of the semester. Average of two test marks out of 30 is added to end term marks out of 70. Thus total marks of the course are given out of 100.

After test as well as end term examination bitwise analysis of answer book of each student will be done in order to calculate course outcome attainment. From course attainment, PO and PSO attainment will be calculated. If attainment is not satisfactory remedial measures will be taken by respective department.

Entire curriculum of all Programmes is as per following levels

Level1- Science and Humanities (10 to 15%)

Level2- Core Technology (25 to 30%)

Level3- Applied Technology (45 to 50%)

Level4- Diversified Courses (5 to 10%)

Level5- Management courses (3 to 5%)

Course Coding Scheme:-

Course Code abbrevations	Definitions
HU	Humanities
SC	Science
MG	Management
CE	Civil
CO	Computer
EC	Electronics
EE	Electrical
IT	Information Technology
IS	Instrumentation
RT	Rubber
LT	Leather Technology
LG	Leather Goods and Footwear
ME	Mechanical Engineering

Course codes are formed as:

First two letters are course code abbreviations. Then two digits "16" refers to 2016 curriculum.

Next digit is level number and last two digits are serial number from that level.

For example: HU16101 (Basics of Communication)

HU- It belongs to Level 1 Science & humanities

16- 2016 curriculum

1- Level 1

01- Sr. No of Level 1 courses.