LENDI PROCESS MANUAL
FOR
OUTCOME BASED EDUCATION
(DESIGN, IMPLEMENTATION & ASSESSMENT)

LENDI INSTITUTE OF ENGINEERING & TECHNOLOGY
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TABLE OF CONTENTS

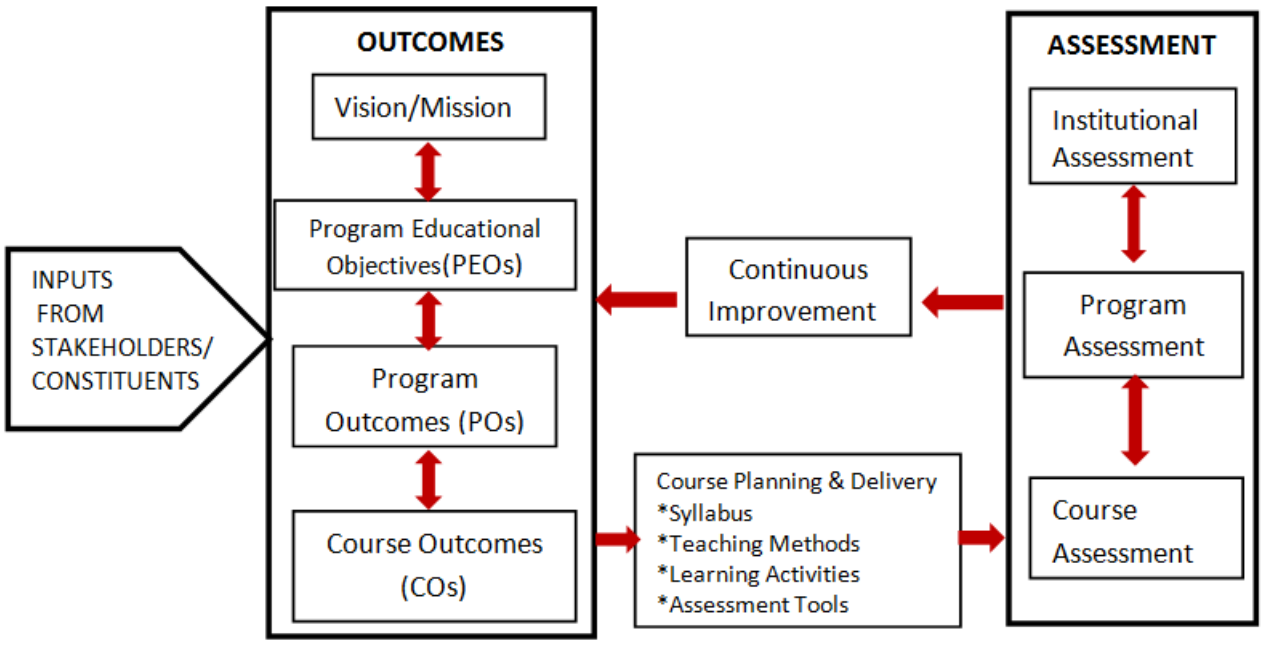
1. INTRODUCTION

1.1 Quality:-Quality is the *Degree of excellence.* Quality has dimensions in our educational system. The reason for this attributed to

- Enhanced quality consciousness
- Increased awareness to stakeholders
- Increased competition in education sector
- The placement and result of students becomes an important performance indicator in an educational institute.
- The stakeholders of an educational institute i.e. Staff, Students, Parents, Alumni and Recruiters are responsible for the standing of the institute in competitive scenario.

1.2 Outcome based Education (OBE): Outcome based education is student centered instruction that focuses on measuring student performance i.e. outcomes. Outcomes include knowledge, skills and attitudes of the Student. OBE focuses on what the students are able to do at the end of each course and at the end of the program. OBE focus remains on evaluation of outcomes of the program, though input and output parameters are also important.

Outcome Based Education Frame Work



1.3 Vision: Vision statement is dream of where one wants the Institute to be and inspires the entire stake holders.

Mission: Mission statements are actionable statements that guide the stake holders to act.

Mission Vs Vision Statement:

Mission statements are essentially the means to achieve the vision of the institution.Vision is a futuristic statement that the institution would like to achieve over a long period of time, and Mission is the means by which it proposes to move toward the stated Vision.

Programme Educational Objectives (PEOs):

Programme educational objectives are broad statements that describe the career and professional accomplishments that the programme is preparing graduates to achieve.

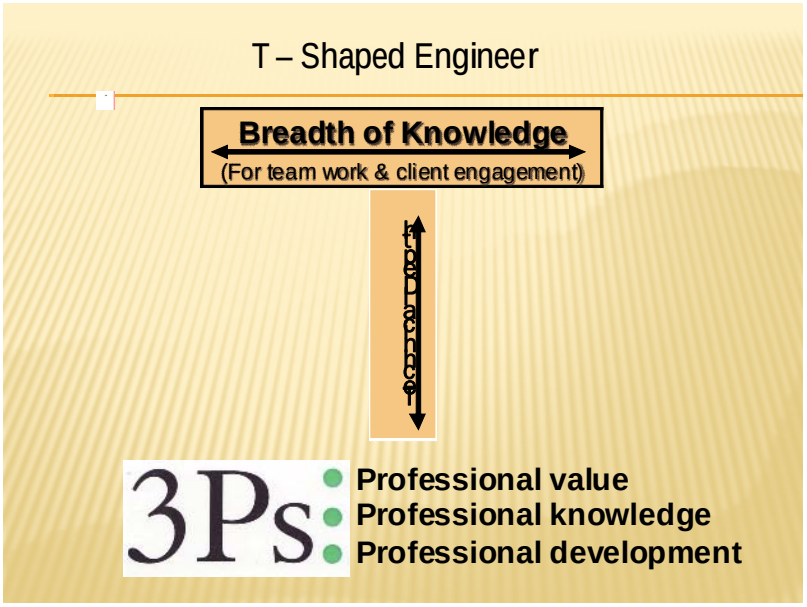
PEO-1: Preparation - Employment/Higher studies

PEO-2: Core Competence - Discipline knowledge

PEO-3: Breadth - T-Shaped Engineer

PEO-4: Professionalism - 3 Ps – Professional value- knowledge -development

PEO-5: Lifelong Learning – environment



Programme Outcomes (POs):

Programme Outcomes are narrower statements that describe what students are expected to know and be able to do upon the graduation. These relate to the skills, knowledge, and behaviour that students acquire in their matriculation through the programme.

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes (COs):

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 behaviour that students acquire in their matriculation through the course.

Writing Course Outcomes:

- **Goals:** Represent overall mission of the program, department, course, etc.
- **Objectives :** Broader perspective on what generally students should know, value or do.
- **Outcomes :** What students should demonstrate/represent relative to objective.

Course outcomes will help the students to:

1. Get clarity in their course goals
2. Provide framework for measuring their success (self-evaluation)
3. Reduce their anxiety (they get better clarity regarding the cognitive level in which they have to perform)
4. Learn effectively

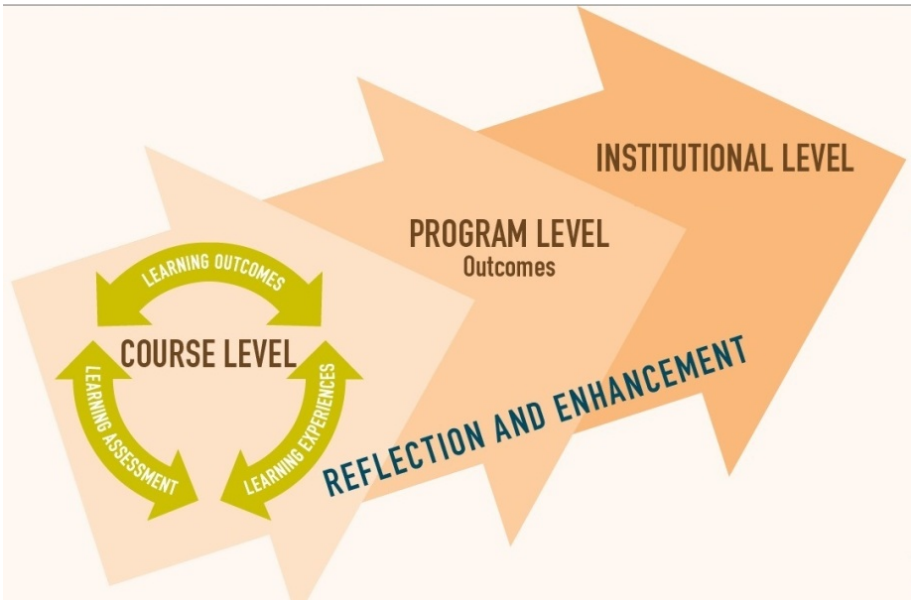
Course outcomes will help the faculty to:

1. Prepare classroom material in a better way (class notes, session plans, discussion topics etc.)
2. Keep the focus on specific end results (teaching is focused to achieve course outcomes)
3. Create homework, assignments (selecting appropriate assignments to meet learning outcomes)
4. Design appropriate questions in the tests (teaching and assessment will be at par)

TIPS for designing of Course outcomes:

1. Course outcomes can be understood by students, faculty, and individuals outside of the discipline.

2. Course outcomes are related to course, program and college goals. Check that outcome fit within the program and course objectives and reflect the unique strengths/ character of the program.
3. Focus on outcomes, but not on processes.
4. Start each outcome with some action verb according to Bloom's taxonomy..
5. Avoid vague verbs such as know and understand.
6. Check that the verbs used reflect the level of course outcome required.
7. Ensure that the course outcomes are observable and measurable. Course outcomes are specific enough to be evaluated (i.e., each examines something discrete).
    a) They use verbs that indicate how the student work can be observed.
    b) They focus on what the student should do, not what the instructor teaches.
    c) They reflect what students should be able to do after a course ends, not simply what they do during the course.
    d) They usually can be assessed in more than one way.
    e) They can be understood by someone outside the discipline.
8. Check that the course outcomes reflect knowledge, skills required in the workplace.
9. Include outcomes that are woven into the entre course(such as work effectively in teams)
10. Check the appropriate number of outcomes which cover the entire course.
11. Advanced courses will normally have learning outcomes in the higher order thinking domains such as ‘analysing’, ‘evaluating’ and ‘creating’.



Course outcomes have three major characteristics:

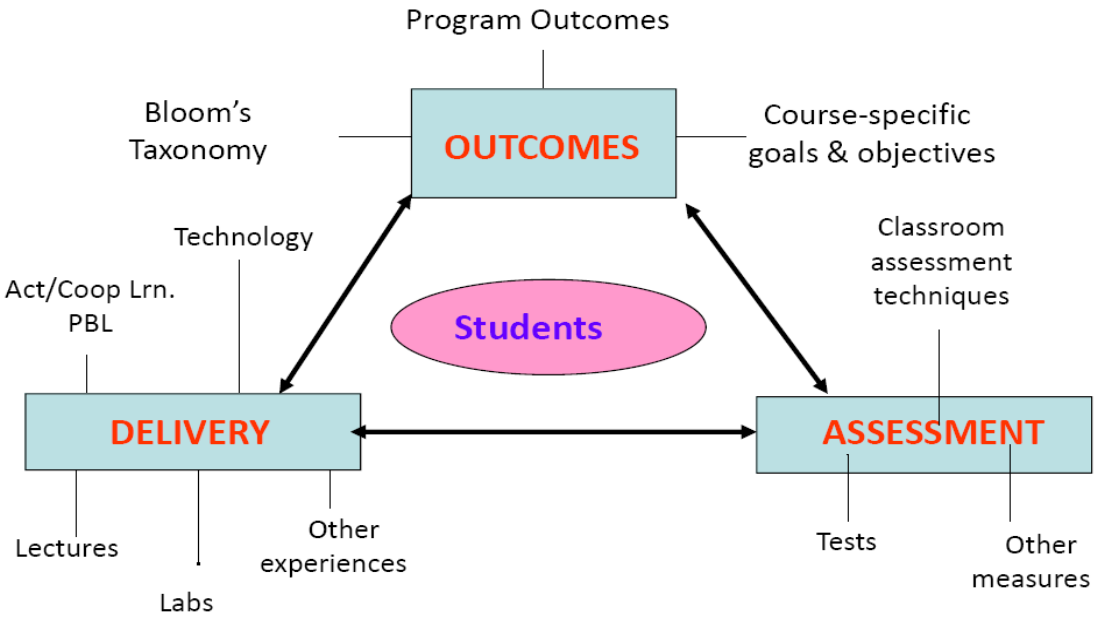
1. They specify an action by the students/learners that is *observable*
2. They specify an action by the students/learners that is *measurable*
3. They specify an action that is done by the *students/learners*

Examples of good action words:

Compile, identify, create, plan, revise, analyze, design, select, utilize, apply, demonstrate, prepare, use, compute, discuss, explain, predict, assess, compare, rate, critique, outline, or evaluate

Sample Course Outcomes

- Understand the fundamental concepts and techniques in digital electronics.
- Understand and examine the structure of various number systems and its application in digital design.
- Design various combinational and sequential circuits.
- Identify basic requirements for a design application and propose a cost effective solution.
- Identify and prevent various hazards and timing problems in a digital design.
- Acquire the development skill to build, and troubleshoot digital circuits.
- Identify and describe what techniques are used in Distribution Automation systems.
- Able to identify the characteristics of Classification techniques from other Distribution Automation Techniques.



1.4 Bloom's Taxonomy:

Bloom's Taxonomy was created in 1956 under the leadership of educational psychologist Dr Benjamin Bloom in order to promote higher forms of thinking in education, such as analyzing and evaluating concepts, processes, procedures, and principles, rather than just remembering facts (rote learning).

The Three Domains of Learning:

- *Cognitive: Mental skills (knowledge)*
- *Affective: Growth in feelings or Emotional areas (attitude or self)*
- *Psychomotor: Manual or Physical skills (skills)*

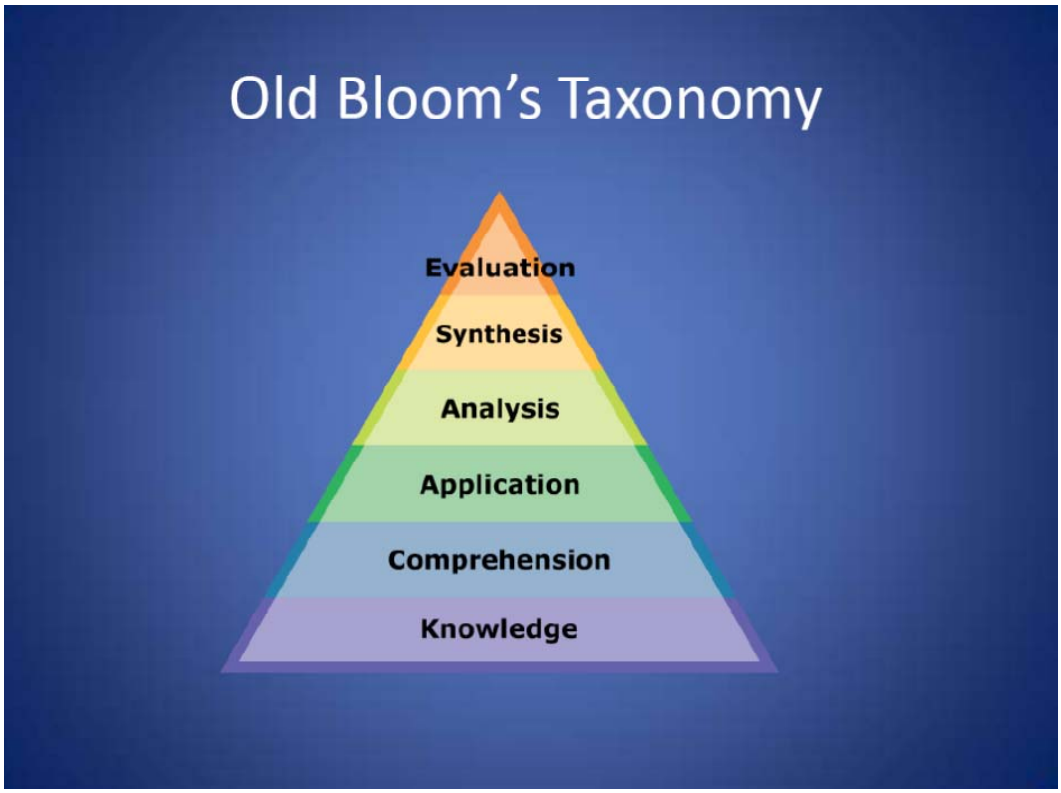
Revised Bloom's *Taxonomy(RBT):*

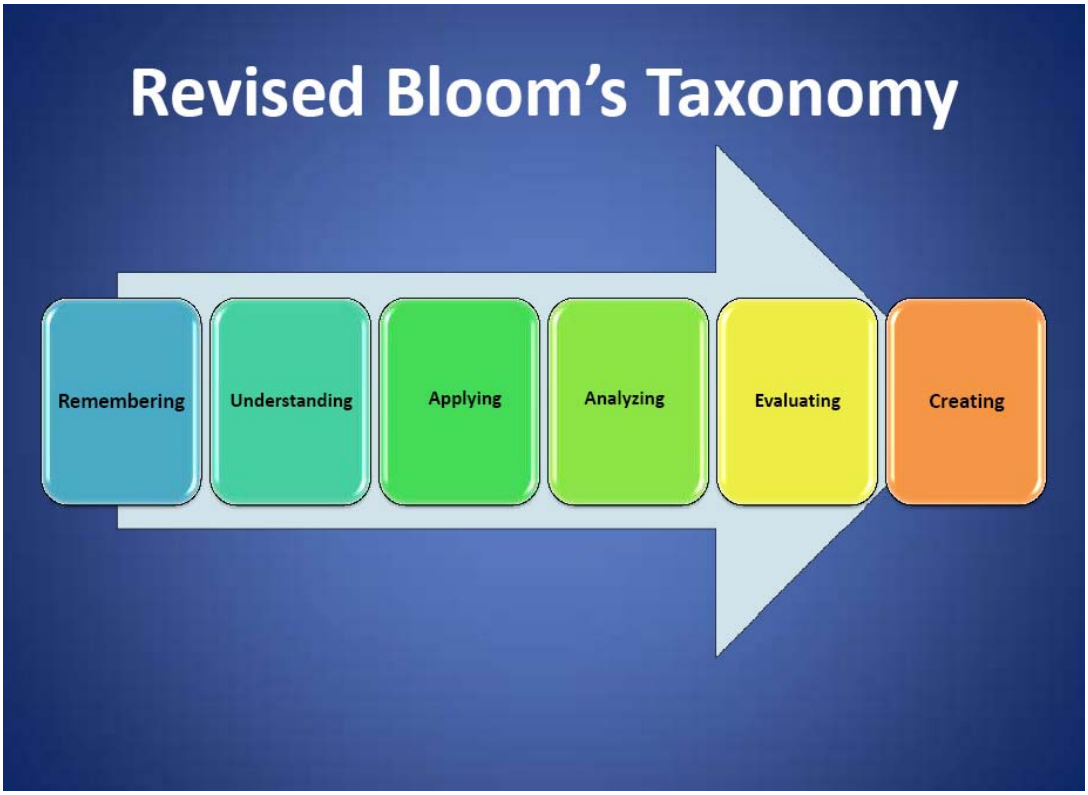
- *Bloom's Taxonomy is a chart of ideas*
- *Named after the creator, Benjamin Bloom*
- *A Taxonomy is an arrangement of ideas Or a way to group things together*

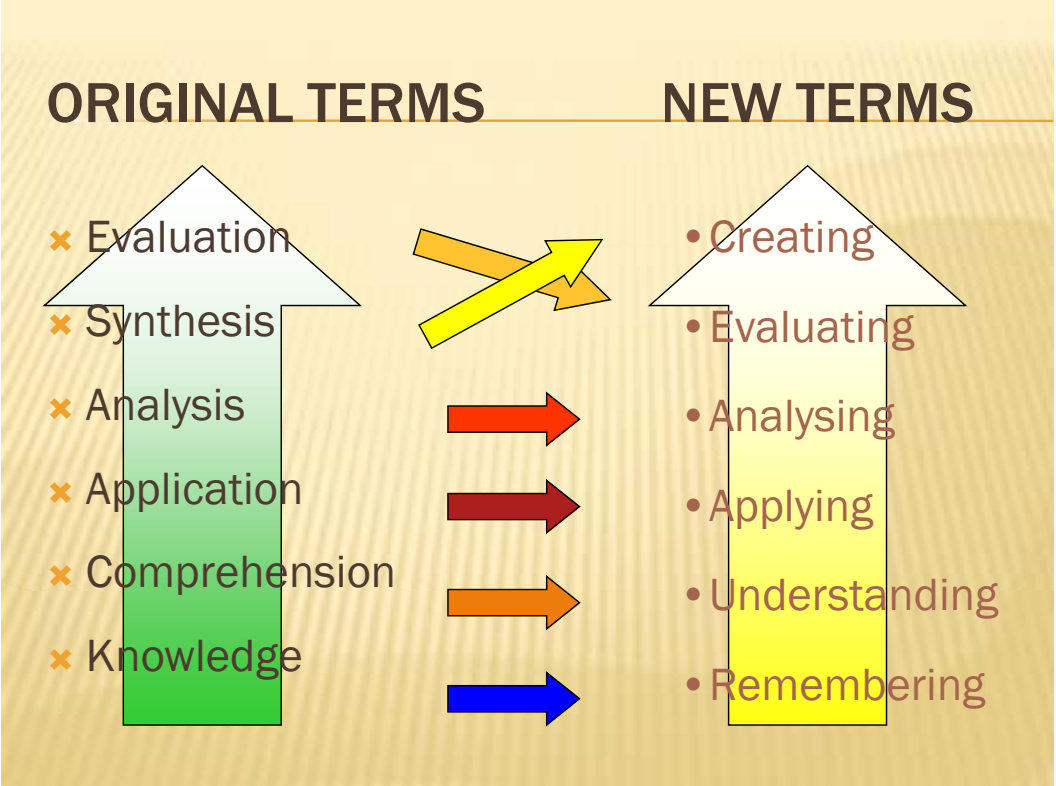
Bloom's Revised Taxonomy

Lorin Anderson, a former student of Bloom, and David Krathwohl revisited the cognitive domain in 2000):

- changing the names in the six categories from noun to verb forms
- creating a processes and levels of knowledge matrix
- Taxonomy of Cognitive Objectives
- Means of expressing qualitatively different kinds of thinking
- Adapted for classroom use as a planning tool
- Continues to be one of the most universally applied models
- Provides a way to organise thinking skills into six levels, from the most basic to the higher order levels of thinking


Old Bloom's Taxonomy
Evaluation
Synthesis
Analysis
Application
Comprehension
Knowledge


Revised Bloom's Taxonomy
Remembering
Understanding
Applying
Analyzing
Evaluating
Creating



1. Remembering: Recalling information.

Recognising, listing, describing, retrieving, naming, finding

2. Understanding: Explaining ideas or concepts.

Interpreting, summarising, paraphrasing, classifying, explaining

3. Applying: Using information in another familiar situation

Implementing, carrying out, using, executing

4.Analysing: Breaking information into parts to explore understandings and relationships

Comparing, organising, deconstructing, interrogating, finding

5. Evaluating: Justifying a decision or course of action

Checking, hypothesising, critiquing, experimenting, judging

6. Creating: Generating new ideas, products, or ways of viewing things.

Designing, constructing, planning, producing, inventing.

Tips For Writing Essay Questions:

- Restrict The Use To Those Learning Objectives That Cannot Be Measured Otherwise
- Construct Questions That Will Call Forth The Skills Specified In The Learning Standards
- Phrase The Question So That The Student's Task Is Clearly Indicated
- Indicate An Approximate Time Limit For Each
- Avoid The Use Of Optional Questions

Action Verbs for creating learning outcomes (Bloom's Revised Taxonomy)

Level 1. Remember

Choose	Describe	Define	Identify	Label
List	Locate	Match	Memorize	Name
Omit	Recite	Select	State	Count
Draw	Outline	Point	Quote	Read
Recall	Recognize	Repeat	Reproduce	

Level 2. Understand

Classify	Defend	Demonstrate	Distinguish	Explain
Express	Extend	Give Examples	Illustrate	Indicate
Interrelate	Interpret	Infer	Judge	Match
Paraphrase	Represent	Restate	Rewrite	Select
Show	Summarize	Tell	Translate	Associate

Compute	Convert	Discuss	Estimate	Extrapolate
Generalize	Predict			
Level 3. Apply				
Apply	Choose	Dramatize	Explain	Generalize
Judge	Organize	Paint	Prepare	Produce
Select	Show	Sketch	Solve	Use
Add	Calculate	Change	Classify	Complete
Compute	Discover	Divide	Examine	Graph
Interpolate	Manipulate	Modify	Operate	Subtract
Use				
Level 4. Analyze				
Analyze	Categorize	Classify	Compare	Differentiate
Distinguish	Identify	Infer	Point out	Select
Subdivide	Survey	Arrange	Breakdown	Combine
Design	Detect	Diagram	Develop	Discriminate
Illustrate	Outline	Relate	Point out	Separate
Utilize				
Level 5. Evaluate				
Appraise	Judge	Criticize	Defend	Compare
Assess	Conclude	Contrast	Critique	Determine
Grade	Justify	Measure	Rank	Rate
Support	Test			
Level 6. Create				
Choose	Combine	Compose	Construct	Create
Design	Develop	Do	Formulate	Hypothesize
Invent	Make	Originate	Organize	Plan
Produce	Role Play	Tell	Compile	Drive
Devise	Explain	Generate	Group	Integrate
Prescribe	Propose	Rearrange	Reconstruct	Reorganize

2. INSTITUTE VISION AND MISSION

VISION

Producing globally competent and quality technocrats with human values for the holistic needs of industry and society.

MISSION

- Creating an outstanding infrastructure and platform for enhancement of skills, knowledge and behaviour of students towards employment and higher studies.
- Providing a healthy environment for research, development and entrepreneurship, to meet the expectations of industry and society.
- Transforming the graduates to contribute to the socio-economic development and welfare of the society through value based education.

3. DEPARTMENT VISION, MISSION, PEO'S AND PSO'S

3.1 Department of Electronics and Communication Engineering

Vision

Emerge as a Center of Eminence in Electronics and Communication Engineering to impart quality education towards highly skilled and competent engineers.

Mission

- Offering an inspiring and conducive learning environment to prepare skilled and competent engineers.
- Providing practical skills and project based education for meeting the growing challenges of industry.
- Arranging an unique environment towards entrepreneurship by fostering innovation, creativity, freedom and empowerment.
- Imparting professional behavior, strong ethical values, innovative research capabilities and leadership abilities.

Program Educational Objectives

1. Graduates will have strong knowledge, skills and attitudes towards employment, higher studies and research.
2. Graduates shall comprehend latest tools and techniques to analyze, design and develop novel systems and products to solve real life problems.
3. Graduates shall have multidisciplinary approach, professional attitude, ethical values, good communication, teamwork and engage in life-long learning to adapt the rapidly changing technologies.

Program Specific Outcomes (PSOs):

1. Capable of design, develop, test, verify and implement analog and digital electronics and communication engineering systems and products.
2. Qualify in national and international competitive examinations for successful higher studies and employment.

3.2 Department of Computer Science And Engineering

Vision

To be a frontier in computing technologies to produce globally competent computer science engineering graduates with moral values to build a vibrant society and nation.

Mission

- Providing a strong theoretical and practical background in computer science engineering with an emphasis on software development.
- Inculcating professional behavior, strong ethical values, innovative research capabilities, and leadership abilities.
- Imparting the technical skills necessary for continued learning towards their professional growth and contribution to society and rural communities.

Program Educational Objectives

1. Graduates will have strong knowledge and skills to comprehend latest tools and techniques of Computer Engineering so that they can analyze, design and create computing products and solutions for real life problems.
2. Graduates shall have multidisciplinary approach, professional attitude and ethics, communication and teamwork skills, and an ability to relate and solve social issues through through their Employment, Higher Studies and Research.
3. Graduates will engage in life-long learning and professional development to adapt to rapidly changing technology.

Program Specific Outcomes (PSOs):

1. Ability to grasp advanced programming techniques to solve contemporary issues.
2. Have knowledge and expertise to analyze data and networks using latest tools and technologies.
3. Qualify in national and international competitive examinations for successful higher studies and employment.

3.3 Department of Mechanical Engineering

VISION

Envisions mechanical engineers of highly competent and skilled professionals to meet the needs of the modern society.

MISSION

- Providing a conducive and inspiring learning environment to become competent engineers.
- Providing additional skills and training to meet the current and future needs of the Industry.
- Providing an unique environment towards entrepreneurship by fostering innovation, creativity, freedom and empowerment.

Program Educational Objectives

1. Graduates will have strong knowledge, skills and attitudes towards employment, higher studies and research.
2. Graduates shall comprehend latest tools and techniques to analyze, design and develop novel systems and products for real life problems.
3. Graduates shall have multidisciplinary approach, professional attitude, ethics, good communication, teamwork and engage in life-long learning to adapt the rapidly changing technologies.

Program Specific Outcomes (PSOs):

1. Capable of design, develop and implement sustainable mechanical and environmental systems.
2. Qualify in national and international competitive examinations for successful higher studies and employment.

3.4 Department of Electrical And Electronics Engineering

Vision

To be a hub for imparting knowledge, skills, and behaviour for exemplary contributions in the field of Electrical and Electronics Engineering.

Mission

- To impart Technical Education through the state-of-the-art infrastructure facilities, laboratories and instruction.
- To inculcate industry oriented learning through industrial visits, internships, projects at Industries, MOUs, to make students' technically skills oriented.
- Creating conducive environment for higher education, employment and entrepreneurship through quality education, professional skills and research.
- To promote societal commitment among students by inculcating moral and ethical values.

Program Educational Objectives

1. Graduates shall have strong foundation in core and allied Electrical and Electronics Engineering, in sciences and mathematics, to become globally competent in designing, modelling and critical problem solving.
2. Graduates shall involve in research activities in the field of electrical and electronics engineering through lifelong learning and provide solutions to engineering problems for sustainable development of society.
3. Graduates shall have good communication skills and socio-ethical values for getting employment or higher studies by excelling in competitive examinations and be able to work in supportive and leadership roles change.

Program Specific Outcomes (PSOs):

1. Capable of design, develop, test, verify and implement electrical and electronics engineering systems and products.
2. Succeed in national and international competitive examinations for successful higher studies and employment.

4. Assessment of Course Outcomes

4.1 Course Outcome Statement:

The course outcome should prepare by respective course instructor and these statements are verified by Program Assessment Committee to meet the expected program outcomes.

Sample(EEE)

COURSE	COURSE OUTCOMES	
Electrical Circuit Analysis-II C201	**C201.1**	Analyze and determine three phase circuit parameters under balanced conditions
	C201.2	Analyze and determine three phase circuit parameters under unbalanced conditions
	C201.3	Understand the transient and steady state behavior of passive elements for DC and AC excitations.
	C201.4	Determine and relate two port network parameters and understand stability of network functions.
	C201.5	Design and synthesis of complex electrical circuits.
	C201.6	Understand wave symmetry and harmonics, representation of a finite series into an infinite series.

Sample (ECE)

COURSE	COURSE OUTCOMES	
Electronic Devices and Circuits C202	**C202.1**	Understand the basic concepts of semiconductor physics.
	C202.2	Classification and working principle of different semiconductor electronic devices and their applications.
	C202.3	Design and Analyse the working of diode as a rectifier.
	C202.4	Demonstrate working principle of different BJT and FET configurations and analyse their behaviour.
	C202.5	Illustrate different biasing circuits using BJT and FETS to calculate stability parameters.
	C202.6	Summarize the design of small signal low frequency amplifier models for simple applications.

Sample (CSE)

COURSE	COURSE OUTCOMES	
Data Structures C205	**C205.1**	Analyze different algorithms, searching and sorting techniques based on their complexity.
	C205.2	Acquire the knowledge on selection of data structure such as stacks and queues, to solve various computing problems.
	C205.3	implement data structures using linked list.
	C205.4	Choose the data structure like binary trees and binary search trees to solve storage problems.
	C205.5	Identify binary search trees to solve problems.
	C205.6	Apply linear/non linear data structures like graphs in suitable issues.

Sample (ME)

COURSE	COURSE OUTCOMES	
Metallurgy and Material Science C201	**C201.1**	Understand the basic concepts of bonds in metals and alloys, and To know the basic requirements for the formation of solid solutions and other compounds.
	C201.2	Identify the regions of stability of the phases that can occur in an alloy system
	C201.3	Identify the differences between cast irons and steels, their properties and practical applications.
	C201.4	Apply the concept of heat treatment of steels & strengthening mechanisms
	C201.5	Identify the properties and applications of widely used non-ferrous metals and their alloys
	C201 .6	Analyze the properties and applications of ceramic, composite materials and other materials, and describe the various methods of component manufacture of composite.

4.2 CO - POs / PSOs Mapping:

The CO - POs / PSOs Mapping with justifications should prepare by respective course instructor and these statements are verified by Program Assessment Committee to meet the expected program outcomes.

Sample (EEE)

Electrical-Circuit-Analysis-II (C201)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C201.1	3	3	3	2	-	-	-	-	-	-	-	3	3	3
C201.2	3	3	3	2	-	-	-	-	-	-	-	3	3	3
C201.3	3	3	2	1	-	-	-	-	-	-	-	2	3	3
C201.4	3	2	2	1	-	-	-	-	-	-	-	2	2	3
C201.5	2	2	3	1	-	-	-	-	-	-	-	2	2	1
C201.6	3	3	1	2	-	-	-	-	-	-	-	2	1	2
C201*	3	3	2	2	-	-	-	-	-	-	-	3	3	3

Sample (ECE)

Electronic Devices and Circuits (C202)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C202.1	3	3	-	1	-	-	-	-	-	-	-	2	-	2
C202.2	3	3	1	2	-	-	2	-	-	-	-	2	1	2
C202.3	3	3	2	2	-	-	-	-	-	-	-	2	3	3
C202.4	3	3	1	2	-	-	-	-	-	-	-	2	3	3
C202.5	3	3	2	3	-	-	-	-	-	-	-	2	1	3
C202.6	3	3	2	3	2	-	2	-	-	-	-	2	1	3
C202*	3	3	2	2	2	-	2	-	-	-	-	2	2	3

Sample (CSE)

Data Structures(C205)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C205.1	2	3	1	-	-	-	-	-	-	-	-	3	3	-	1
C205.2	3	3	3	2	-	-	-	-	-	-	-	3	1	-	2
C205.3	3	3	2	-	3	-	-	-	-	-	-	2	2	1	2
C205.4	3	2	3	-	-	-	-	-	-	-	-	2	1	-	-
C205.5	3	2	2	-	2	-	-	-	-	-	-	3	3	-	2
C205.6	2	2	3	-	-	-	-	-	-	-	-	2	3	-	-
C205.*	3	2	3	2	2	-	-	-	-	-	-	3	3	1	2

Sample (ME)

Metallurgy and Material Science(C201)

S.NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C201.1	3	2				1						1		3
C201.2	1	3		2										3
C201.3	1	3	1	2							1		2	3
C201.4	3		1	2			1				1		2	3
C201.5	3		2				1				1	1	2	3
C201.6	2	2	2	1		1	1				1	1	2	3
C201 *	2	3	1	1		1	1				1	1	2	3

4.3 Course Outcome Assessment Tools:

The methods of gathering the data for the evaluation of Course Outcomes of first year in the assessment processes:

- **Theory:** As per the university norms, evaluation of the course work is done through internal Assessment and external Assessment for 30 marks and 70 marks respectively.
  - **Mid Exams:** Two Mid Examinations are conducted in each semester to assess student performance for 30 marks with duration of 90 minutes. All the Mid Examination question papers are prepared to achieve specified course outcomes by using revised Bloom's Taxonomy.
  - **Online Exam (Quiz):** Two online quiz examinations are conducted in each semester to assess student performance for 20 marks with duration of 20 minutes
  - **Assignments:** Assignments are intended to evaluate students' knowledge on contents of each course with 5 marks on each assignment. All assignment questions are prepared to achieve specified course outcomes by using revised Bloom's Taxonomy.
  - **University Examination:** The University will conduct end-semester examinations for duration of 3-hours and cover the whole syllabus of the course and are assessed for 70 marks.
- **Practical:** The practical evaluation contains the following components.
  - **Day to Day Performance**: Practical sessions play a key role to build up the essential abilities in the hands on experience of practical skills and enhancing an individual along with team work skills among the students. Performance of the students are recorded with the specified course outcomes of the practical course.
  - **Record:** The marks of students' record of practical work performed on every week are evaluated for assessment of the specified course outcomes.
  - **Internal Lab Exam:** A lab exam of three hours is conducted to evaluate the hands on experience of student's performance for a given task/experiment and evaluated for assessment of the specified course outcomes.
  - **University Examination:** The end-semester practical examinations are of three hours duration and cover the whole syllabus of the practical course.

Course Type	Assessment Method	Assessment Tools	Frequency	Maximum Marks	Duration
Theory Course	**Internal Assessment**	Mid Exam	Twice per Semester	15/30	90min
		Online Exam(Quiz)	Twice per Semester	10/20	20min
		Assignments	Six per semester	5	30min
	University Assessment	University Exam	Once per Semester	70	3 hours
Practical Course	**Internal Assessment**	Day to Day Performance	Every lab Session	10	3 hours
		Record work	End of Semester	5	-
		Internal Lab exam	Once per Semester	10	3 hours
	University Assessment	University Exam	Once per Semester	50	3 hours

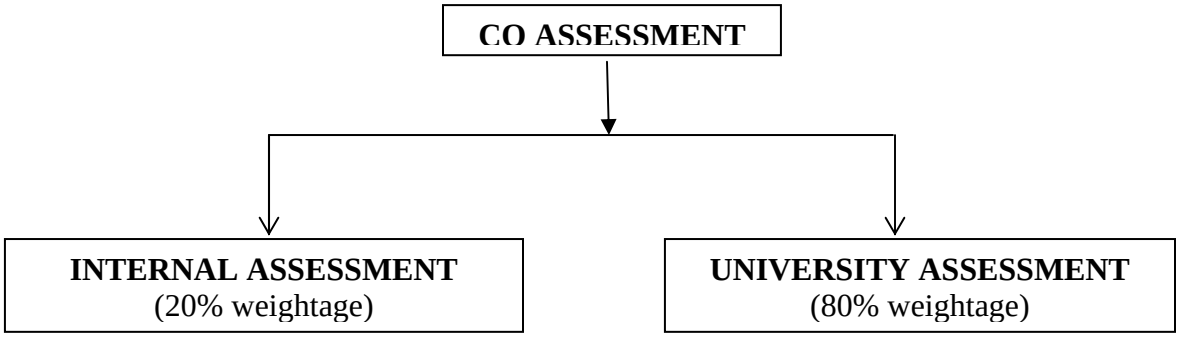
- **Project Assessment:**

Course Type	Assessment Tools	Minimum Frequency
Project	First Review	Once per course
	Second Review	
	Final review	
	Viva Voce (University Assessment)	Once per program

- **Project Evaluation:**

Evaluation	Review	Maximum Marks	Mode of evaluation
Internal	First	20	Abstract defense
	Second	20	Work Progress and presentation
	Third	20	Demonstrate project and submit project draft
External	--	140	Demonstrate project, viva-voce and submit final project report

4.4 Course Outcome Assessment Rubrics: Course Outcome is assessed in view of the performance of students in internal assessment and in university examination of a course. Internal assessment contributes 20% and university assessment contributes 80% to the aggregate attainment of a CO.



- **Threshold Value**: The Threshold value (%) of each course is calculated from the University Average Percentage Marks on theory and lab courses of previous year. And the threshold value of each course is the target for CO assessment. Attainment is measured in terms of actual percentage of students getting set percentage of marks (Threshold value).
  - If targets are achieved then all the course outcomes are attained for that year. Program is expected to set higher targets for the following years as a part of continuous improvement.
  - If targets are not achieved the program should put in place an action plan to attain the target in subsequent years.
- **Attainment Levels:** The attainment levels of COs Vs. targets:

Assessment Methods	**Attainment Levels**	
Internal/ University Assessment	**Level 1**	The percentage of students scoring more than the Threshold value (University Average Percentage Marks) is less than 50%.
	Level 2	The percentage of students scoring more than the Threshold value (University Average Percentage Marks) lies between 50-59%.
	Level 3	The percentage of students scoring more than the Threshold value (University Average Percentage Marks) is more than 60% .

4.5 Course Outcome Assessment:

Sample Course Outcome Attainment Sheet:

LENDI INSTITUTE OF ENGINEERING AND TECHNOLOGY
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COURSE ASSESMENT WORK SHEET

SUBJECT CODE:	
SUBJECT NAME:	
BRANCH:	
YEAR & SEM:	
ACADEMIC YEAR:	
NAME OF THE FACULTY:	

Threshold point(%)		-	50
LEVEL	LOWER LIMIT	-	UPPER LIMIT
LOW - 1(%)	0	-	49
MODERATE - 2(%)	50	-	59
HIGH - 3(%)	60	-	100

Absent	
Not attempted	

S. NO	REG NO	NAME OF THE STUDENT	MID-1 EXAM (30M)			MID-2 EXAM (30M)			ASSIGNMENTS(5 M)						Quiz-1 MARKS (10M)	Quiz-2 MARKS (10M)	University Exams (100M)
			Q1	Q2	Q3	Q1	Q2	Q3	1	2	3	4	5	6			
1			7	10	4	9	8	8	3	3	3	3	3	3	4	5	60
2			8	10	5	7	10	10	3	3	3	3	3	3	7	3	90
3			6	6	4	9	1	8	4	4	4	3	3	3	5	3.5	60
4			7	10	7	8		6	2	2	2	2	2	2	3.5	4.5	50
5			4	8		6	4	2	3	3	3	2	2	2	3.5	1.5	37.5
Marks Allocated for the Corresponding Question			10	10	10	10	10	10	5	5	5	5	5	5	20	20	100
Threshold Mark			5	5	5	5	5	5	2.5	2.5	2.5	2.5	2.5	2.5	10	10	50
The Number of students Performing			57	56	54	58	54	56	58	58	58	58	58	58	57	58	58
The Number of students Performing above Threshold point			53	53	29	57	49	48	41	41	41	36	36	36	0	0	51
The Percentage of students Performing above Threshold point			92.98	94.64	53.70	98.28	90.74	85.71	70.69	70.69	70.69	62.07	62.07	62.07	0.00	0.00	87.93
CO MAPPING			CO1	CO2	CO3	CO4	CO5	CO6	CO1	CO2	CO3	CO4	CO5	CO6	CO1-CO3	CO4-CO6	CO1- CO6
STUDENTS PERFORMANCE CO WISE			3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	3.0
THE Average of performance co wise			3.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	1.0	1.0	3.0

Course Outcome Attainment Calculation Method of a Course:

CO Attainment of C102						
Threshold Value in Percentage: 56%						
Assessment Tool	**C101.1**	**C101.2**	**C101.3**	**C101.4**	**C101.5**	**C101.6**
Mid Exam 1	3.00	3.00	3.00	-	-	-
Mid Exam 2				3.00	3.00	3.00
Online Exam (Quiz-1)	1.00	1.00	1.00	-	-	-
Online Exam Quiz-2	-	-	-	2.00	2.00	2.00
Assignments	3.00	3.00	3.00	3.00	3.00	3.00
Internal Exams Attainment (IEA). (The average of the above)	2.33	2.33	2.33	2.67	2.67	2.67
University Exam Attainment (UEA)	2.00	2.00	2.00	2.00	2.00	2.00
Total Attainment (20% of IEA +80% of UEA)	2.07	2.07	2.07	2.12	2.3	2.13
CO Attainment(The average of all COs): 2.10						

4.6 Course Outcome Attainment of all Courses: Prepare the following table for all courses:

Semester-1								
Course Name	**Course**	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	**CO**
English – I	**C101**	2.70	2.73	2.70	2.80	2.73	2.77	
Mathematics – I	**C102**	2.47	2.57	2.57	2.63	2.60	2.63	
Applied Chemistry	**C103**	2.90	2.87	2.83	2.97	2.97	2.97	
Engineering Mechanics	**C104**	2.87	2.90	2.87	3.00	3.00	3.00	
Computer Programming	**C105**	2.90	2.77	2.90	3.00	3.00	3.00	
Environmental Studies	**C106**	2.87	3.00	3.00	3.00	3.00	3.00	
Applied / Engineering Chemistry Laboratory	**C107**	3.00	3.00	3.00	3.00	3.00	3.00	
English- Communication Skills Laboratory – I	**C108**	2.80	2.80	2.80	2.80	2.80	2.80	
C Programming Laboratory	**C109**	3.00	3.00	3.00	3.00	3.00	3.00	

4.7 The Contribution of CO to each POs/PSOs:

Let us assume X is the CO attainted value of a course C101.

1. If the mapping CO to the PO_i is L or 1 then the contribution of CO to PO_i is X/3
2. If the mapping CO to the PO_i is M or 2 then the contribution of CO to PO_i is 2X/3
3. If the mapping CO to the PO_i is H or 3 then the contribution of CO to PO_i is X

   Where i= 1,2,…12.

Similarly, calculate the contribution of CO to PSOs.

Sample Calculation

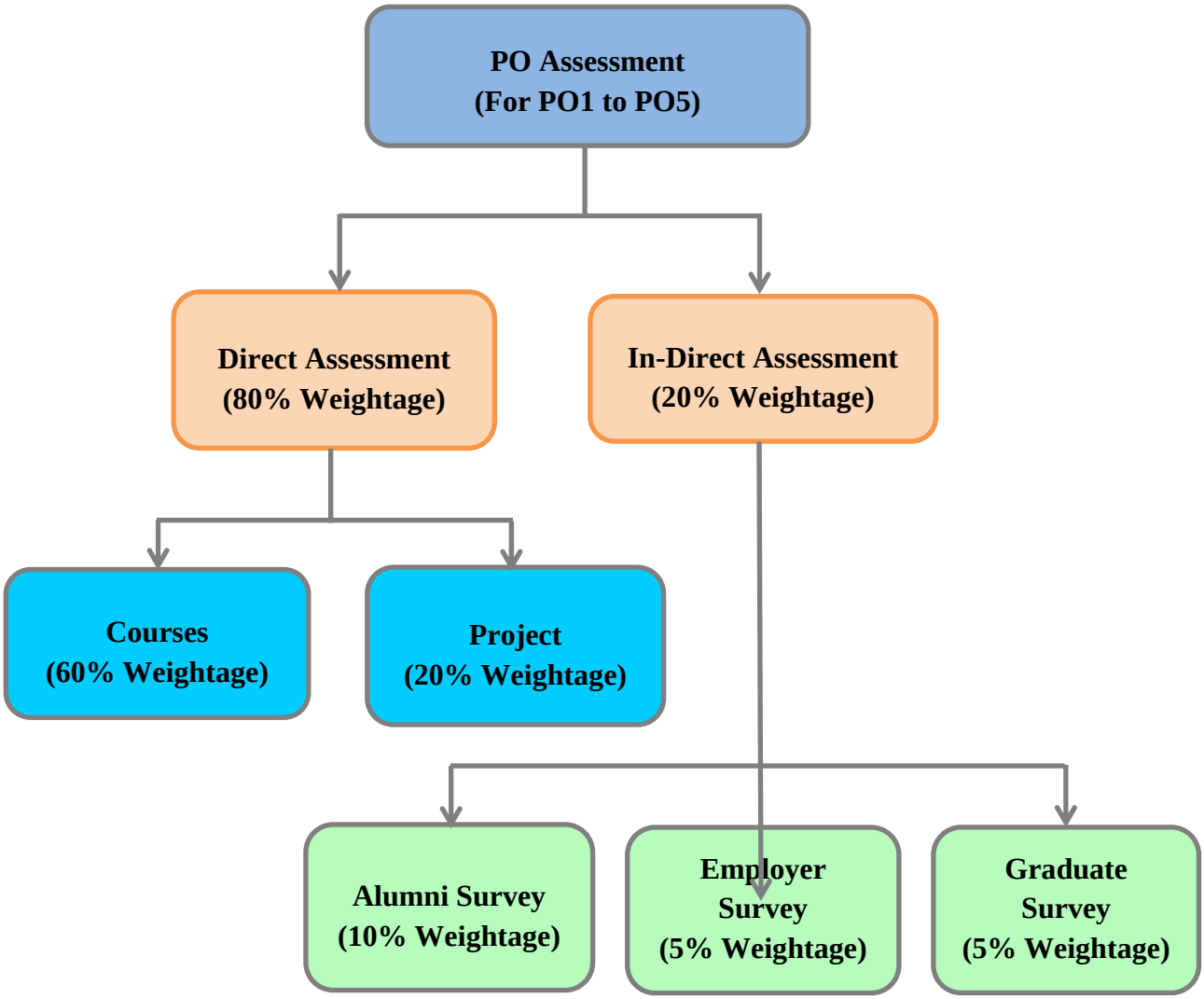
CO CONTRIBUTION TO PO CALCULATION:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C101	H	M	M						M			M	M	M
ATTAINMENT	2.86	1.90	1.90						1.90			1.90	1.90	1.90

CO CONTRIBUTION TO PO – 33%, 67%, 100% (1-L/2-M/3-H)

5. ASSESSMENT OF PROGRAM OUTCOMES

(i) The Assessment of PO1 to PO5 & PSOsInstructions:



Assessment tools and processes for PO1 to PO5

PO assessment for PO1 to PO5 is done by giving 80% weightage to direct assessment and 20% weightage to indirect assessment. Direct assessment is based on COURSES and PROJECT attainment where 60% weightage is given to attainment through Courses and 20% weightage is given to attainment through Projects. Indirect assessment is done through program graduate survey, alumni survey and employer survey where program graduate survey and employer survey are given a weightage of 5% each and alumni survey is given a weightage of 10%.

(ii) The Assessment of PO6 to PO12 Instructions:

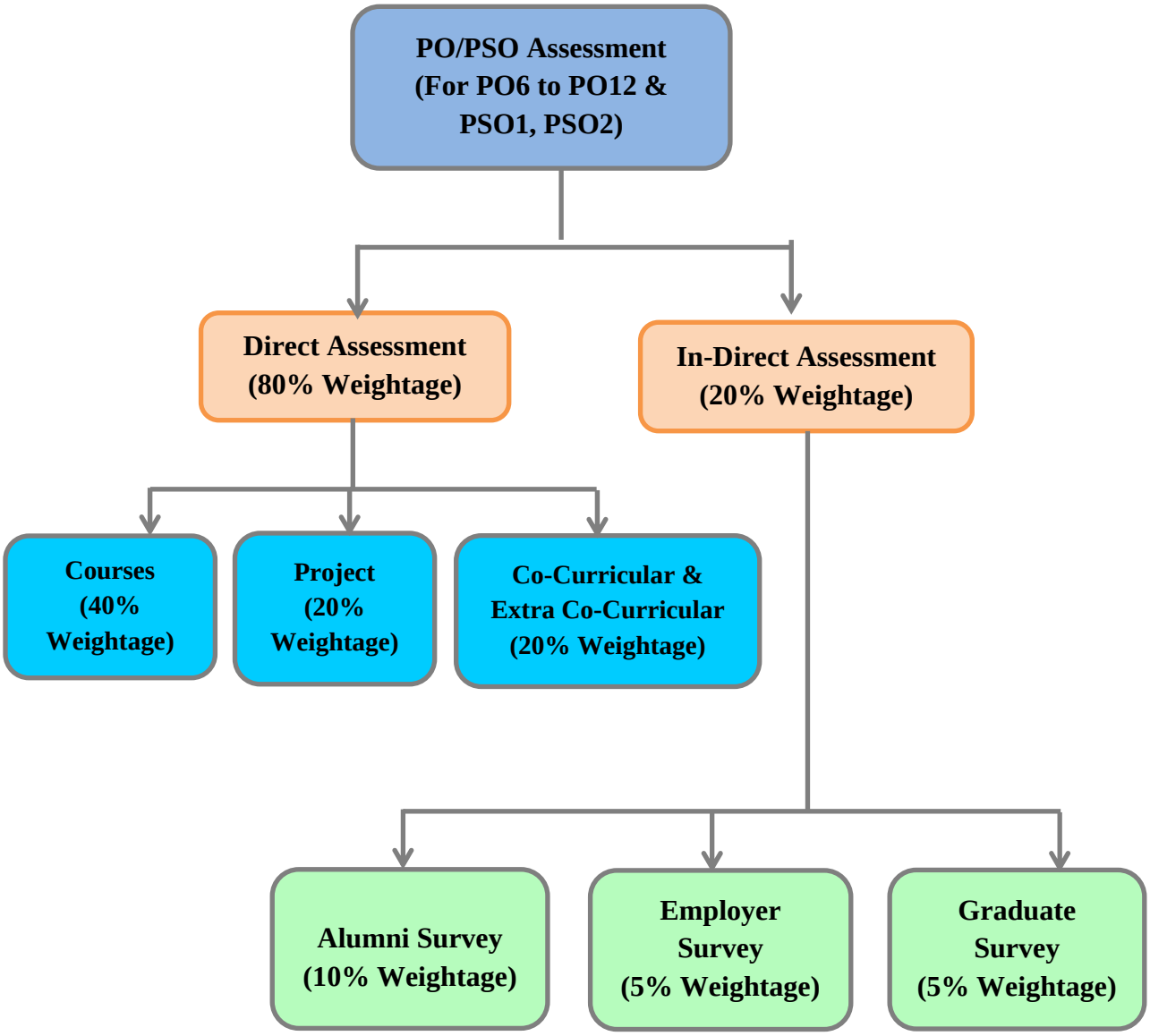


Fig. Assessment tools and processes for PO6 to PO12 & PSO1, PSO2

PO/PSO assessment for PO6 to PO12, PSO1 and PSO2 is done by giving 80% weightage to direct assessment and 20% weightage to indirect assessment. Direct assessment is based on Courses, Project and CO-Curricular & Extra Co-Curricular attainment where 40% weightage is given to attainment through Courses, 20% weightage is given to attainment through Projects and 20% weightage is given to attainment through co-curricular & extra co-curricular activities. Indirect assessment is done through program graduate survey, alumni survey and employer survey where program graduate survey and employer survey are given a weightage of 5% each and alumni survey is given a weightage of 1.

Total PO Attainment Calculation

S. No.	Courses /Activities Contributing to PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	Direct Assessment														
1	Courses														
2	Project/ Seminar/Viva Voce Assessment														
3	Co-Curricular And Extra Co-Curricular														
	Indirect Assessment														
4	Graduate Survey														
5	Alumni Survey														
6	Employer Survey														

PO (1-5) Attainment:

S.No.	Courses /Activities Contributing to PO	Assessment Weightage	PO1	PO2	PO3	PO4	PO5
1	COURSES	60%					
2	Project/ Seminar/Viva Voce Assessment	20%					
3	Graduate Survey	5%					
4	Alumni Survey	10%					
5	Employer Survey	5%					
	Total Attainment						

PO (6-12) / PSO (1-2) Attainment:

S.No.	Courses /Activities Contributing to PO	Assessment Weightage	PO6	PO7	PO8	PO9	PO10	PO 11	PO12	PSO1	PSO2
1	Courses	40%									
2	Project/ Seminar/Viva Voce Assessment	20%									
3	Co-Curricular And Extra Co-Curricular	20%									
4	Graduate Survey	5%									
5	Alumni Survey	10%									
6	Employer Survey	5%									
	Total Attainment										

Final PO Attainment:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

6. CONTINUOUS QUALITY IMPROVEMENT

POs & PSOs Attainment Levels and Actions for improvement

POs	Target Level	Attainment Level	Observations
PO1: Engineering Knowledge: **Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.**			
PO1			
ACTIONS: 1)			
PO2: Problem Analysis: **Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.**			
PO2			
ACTIONS: 1)			
PO3: Design/ Development of Solutions: **Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.**			
PO3			
ACTIONS: **1)**			
PO4: Conduct investigations of complex problems: **Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.**			
PO4			
ACTIONS: 1)			
PO5: Modern Tool Usage: **Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.**			
PO5			**a.**
ACTIONS: 1)			
PO6: The Engineer and Society: **Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.**			

PO6	1.5	1.66	
ACTIONS: 1)			
PO7: Environment and Sustainability: **Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.**			
PO7			
ACTIONS: 1)			
PO8: Ethics: **Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.**			
PO8			
ACTIONS: **1)**			
PO9: Individual and Team Work: **Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.**			
PO9			
ACTIONS: 1)			
PO10: Communication: **Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.**			
PO10			
ACTIONS: 1)			
PO11: Project Management and Finance: **Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.**			
PO11			
ACTIONS: 1)			
PO12: Lifelong Learning: **Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.**			
PO12			
ACTIONS: 1)			

Annexure
Survey Forms-1

LENDI INSTITUTE OF ENGINEERING AND TECHNOLOGY
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Jonnada, Denkada (Mandal), Vizianagaram Dist – 535 005
Phone No. 08922-241111, 241666
E-Mail: lendi_2008@yahoo.com Website: www.lendi.org

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Academic Year: **Date:**

SURVEY QUESTIONNAIRE TO EMPLOYER

This questionnaire is designed for the assessment of graduates of Lendi Institute of Engineering & Technology working in or recruited by your organisation. We hope to conduct the survey with a focus to map both Program Outcomes (POs) and Program Specific Outcome (PSOs) with respect to our students' Knowledge, Skills, Abilities, Attitude and other expected attributes. Please rate each of the following questions according to the following scale.

RATING - HIGH: 3; MODERATE: 2; LOW: 1

Company Name:
Name of the Employer:
Contact Details: Email Id: Contact Number:
Recruitment Details:

S.No	Questions	PO/PSO	Rating
1	How did you find our students in applying the knowledge of mathematics, science in the solution of complying engineering problems?	PO1	
2	How did you find our students' ability to identify, formulate, review research literature and analyse complex engineering problems?	PO2	
3	How do you rate our students with respect to design solutions for complex engineering problems and design system components or processes?	PO3	
4	How do you rate our students with respect to the use research-based knowledge and research methods including design of, analysis and interpretation of data, and synthesis of the information to provide valid conclusions?	PO4	
5	How do you rate our students with respect to Modern tool usage?	PO5	

6	How do you rate our students' ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice?	PO6	

7	How do you rate our student's ability to understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development?	PO7	
8	How do you rate our student with respect to applying ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice?	PO8	
9	How do you rate our student with respect to individual and team work?	PO9	
10	How do you rate our students with respect to communicating effectively on complex engineering activities with the engineering community and with society at large?	PO10	
11	How do you rate our students' skills on Project management and finance - demonstrating knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments?	PO11	
12	How do you rate our students with respect to life-long learning - recognising the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change?	PO12	
14	How do you rate our students' capability to design, develop, test, verify and implement electrical and electronics engineering systems and products.	PSO1	
15	How do you rate our students' efforts to succeed in national and international competitive examinations for successful higher studies and employment?	PSO2	

Suggestions:

1	
2	

Remarks on curriculum:

1	
2	

Suggested Gaps on Curriculum:

1	
2	

Remarks on Industry Relevant skills:

1	
2	

Signature of Employers

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

GRADUATE SURVEY FORM

Name the Students:
Regd. No.:
Academic year:

RATING - HIGH: 3; MODERATE: 2; LOW: 1

S.NO	PO/PSO	ATTRIBUTES	RATING
1	PO1	Were you able to apply the knowledge of Mathematics, Science, Engineering Fundamentals and the Engineering specialisation to the solution of complex engineering problems?	
2	PO2	Were you comfortable in identifying, formulating, reviewing and researching literature and analysing complex engineering problems to reach substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	
3	PO3	Were you able to design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations?	
4	PO4	Was it easy to use research-based knowledge and research methods, including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions?	
5	PO5	Were you able to create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations?	
6	PO6	Did you apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional Engineering practice?	
7	PO7	Did you understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development?	
8	PO8	Were you able to apply ethical principles and commit to	

		professional ethics and responsibilities and norms of Engineering practice?	
9	PO9	Did you function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings?	
10	PO10	Did you communicate effectively on complex engineering activities with the engineering community and with society at large?	
11	PO11	Did you demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments?	
12	PO12	Did you recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change?	
13	PSO1	Did you develop the capability to design, develop, test, verify and implement electrical and electronics engineering systems and products.	
14	PSO2	How far did you succeed in qualifying in national and international competitive examinations for successful higher studies and employment?	

Suggestions:

1	
2	

Remarks on curriculum:

1	
2	

Suggested Gaps on Curriculum:

1	
2	

Remarks on Industry Relevant skills:

1	
2	

Signature of Student

Survey Forms-3

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Academic Year: **Date:**

SURVEY QUESTIONNAIRE TO ALUMNI

This questionnaire is designed for the assessment of the Alumni of Lendi Institute of Engineering and Technology to know the required gaps in the curriculum and syllabi to improve the skills of the present students according to the current trends, their experiences and beyond. We hope to conduct the survey with a focus to map both Program Outcomes (POs) and Program Specific Outcome (PSOs) with respect to our students' Knowledge, Skills, Abilities, Attitude and other expected attributes.

Based on your hands-on experience and current trends of the industry, give your suggestions to improve the present curriculum and syllabi. Please rate each of the following questions according to the following scale.

RATING - HIGH: 3; MODERATE: 2; LOW: 1

Name of the Alumni:
Year of Study at this Institution:
Discipline:
Name of the Present Working Company/Studying Institution:
Contact Details: Email Id: Contact Number:

S.No.	Questions	PO/PSO	Rating
1	How do you rate the application of the knowledge of mathematics and science in complying engineering problems?	PO1	
2	How do you rate the present curriculum for its ability to identify, formulate, review research literature and analyse complex engineering problems?	PO2	
3	How do you rate the present curriculum with respect to design solutions for complex engineering problems and design system components or processes?	PO3	
4	How do you rate the present curriculum with respect to the use of research-based knowledge and research methods including design of, analysis and interpretation of data, and synthesis of the information to provide valid conclusions?	PO4	

5	How do you rate the present syllabi with respect to Modern tool usage?	PO5	
6	How do you rate the present curriculum with respect to its ability to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice?	PO6	
7	How do you rate the present curriculum for its ability to understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development?	PO7	
8	How do you rate the present curriculum with respect to applying ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice?	PO8	
9	How do you rate the present curriculum's efficiency with respect to individual and teamwork?	PO9	
10	How do you rate the present curriculum with respect to communicating effectively on complex engineering activities with the engineering community and the society at large?	PO10	
11	According to the current trends, how do you rate the present curriculum with respect to skills on Project management and finance - demonstrating knowledge and understanding of the engineering and management principles and apply them to one's own work, as a member and leader of a team, to manage projects and in multidisciplinary environments?	PO11	
12	Based on your experience, how do you rate the present curriculum with respect to life-long learning - recognising the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change?	PO12	
14	How do you rate the present curriculum for its capability to design, develop, test, verify and implement electrical and electronics engineering systems and products?	PSO1	
15	Based on your experience, how important is qualifying for national and international competitive examinations for successful higher studies and employment?	PSO2	

Suggestions:

1	
2	

Remarks on curriculum:

1	
2	

Suggested Gaps on Curriculum:

1	
2	

Remarks on Industry Relevant skills:

1	
2	

Signature of Alumni