CO - PO/PSO ASSESSMENT AND ATTAINMENT PROCESS MANUAL

DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN

(Autonomous Institution-UGC, Govt. of India)

Accredited by NAAC with 'A+' Grade | Programmes Accredited by NBA

National Ranking by NIRF Innovation – Rank band(151-300), MHRD, Govt. of India

Approved by AICTE, Affiliated to JNTUH, ISO 9001:2015 Certified Institution

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PREAMBLE

Overview of Outcome-Based Education (OBE) Outcome-Based Education (OBE) is an educational framework that emphasizes achieving specific learning outcomes. Unlike traditional education systems that focus on input-based methods, OBE shifts the focus to the learner's ability to demonstrate knowledge, skills, and attitudes at the end of a course or program. It ensures that all educational activities are aligned with predefined outcomes, enabling students to meet industry and societal expectations effectively. OBE is structured around three key components: Course Outcomes (COs), Program Outcomes (POs), and Program Specific Outcomes (PSOs).

Importance of CO-PO-PSO Assessment and Attainment: CO-PO-PSO assessment and attainment are critical to the success of OBE.

These assessments ensure that:

- **Alignment with Stakeholder Expectations:** The program aligns with industry requirements, accreditation standards, and societal needs.
- **Quality Assurance:** Institutions can measure the effectiveness of their educational processes and improve continuously.
- **Enhanced Learning Experience**: Students gain a clear understanding of what is expected of them and work towards specific, measurable goals.
- **Accreditation Compliance:** It fulfills the requirements of accrediting bodies such as NBA showcasing the institution's commitment to quality education.
- **Feedback for Continuous Improvement:** Assessment results highlight gaps in teaching-learning processes, allowing for targeted interventions.

India, OBE and Accreditation: From 13th June 2014, India has become the permanent signatory member of the Washington Accord. Implementation of OBE in higher technical education also started in India. The National Assessment and Accreditation Council (NAAC) and National Board of Accreditation (NBA) are the autonomous bodies for promoting global quality standards for technical education in India. NBA has started accrediting only the programs running with OBE from 2013. The National Board of Accreditation mandates establishing a culture of outcome based education in institutions that offer Engineering, Pharmacy, Management program. Reports of outcome analysis help to find gaps and carryout continuous improvements in the education system of an Institute, which is very essential.

Objectives of the Manual:
This manual is designed to:

- Provide a comprehensive understanding of the OBE framework and its implementation.
- Outline the process of defining, mapping, and assessing COs, POs, and PSOs.
- Offer standardized methods for calculating attainment levels.
- Serve as a guide for faculty, administrators, and coordinators involved in the OBE process.
- Facilitate compliance with accreditation and quality assurance standards.
- Promote continuous improvement in educational practices by leveraging data-driven insights.

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1. INSTITUTE VISION, MISSION AND QUALITY POLICY

VISION

- Visualizing a great future for the intelligentsia by imparting state-of the art Technologies in the field of Engineering and Technology for the bright future and prosperity of the students.

- To offer world class training to the promising Engineers.

MISSION

- To nurture high level of Decency, Dignity and Discipline in women to attain high intellectual abilities.

- To produce employable students at National and International levels by effective training programmes.

- To create pleasant academic environment for generating high level learning attitudes.

QUALITY POLICY

- To undertake Research & Development activities in emerging areas.

- To introduce new innovative courses based on the Industry and societal demands Collaborating with National, International institutions, Research & Development organizations &industries.

- To develop in each student the mastery of fundamentals, motivation for learning, discipline, self-reliance for professional achievement.

- To provide innovative professional education with social responsibilities.

2. DEPARTMENT VISION AND MISSION

VISION

- To establish the Department of Electronics and Communication Engineering as a center of excellence, nurturing a culture of innovation, continuous learning and research.
- To impart students with a strong foundation in technical knowledge, practical skills, analytical thinking, and problem-solving abilities., empowering them to contribute to technological advancements and enhance the quality of life in society

MISSION

- M1: To create an academic environment that empowers students with strong technical knowledge and critical thinking abilities essential for success in the field of electronics and communication engineering.
- M2: To inculcate a culture of innovation and research, enabling our graduates to effectively contribute to technological advancements and meet the constantly changing demands of industry and society
- M3: To Impart technical education with a strong emphasis on dignity, decency, and discipline to develop professional engineers who are both technically competent and socially responsible

3. PROCESS FOR DEFINING THE VISION AND MISSION OF THE DEPARTMENT, AND PEOS OF THE PROGRAM

Crafting the vision and mission of the department is a strategic endeavour aimed at aligning them with the overarching goals of the institute while addressing the expectations of all stakeholders. This process involves thorough discussions at the departmental level, and is shaped through a collaborative approach that includes input from stakeholders, consideration of the departments future trajectory, and an understanding of societal needs. This ensures a vision and mission that are both forward-looking and responsive to community and stakeholder expectations.

A. The Process for Defining Vision and Mission of the Department

The following steps are followed to establish Vision and Mission of Department.

Step 1: Begin with the Vision and Mission of the institute as the foundation and by considering the norms laid by UGC/AICTE/UNIVERSITY.

Step 2: The Program Assessment and Quality Improvement Committee (PAQIC) collects the views from internal and external stake holders.

Composition of PAQIC:

The Program Assessment and Quality Improvement Committee (PAQIC) comprises Head of the Department, Professors and senior faculty members. This diverse group ensures a broad range of perspectives and expertise, enabling effective evaluation and enhancement of academic programs.

Step 3: PAQIC summarizes the recommendations received from stakeholders.

Step 4: PAQIC drafts the Institutes Vision and Mission and submits it to the Department Advisory Board (DAB) for review.

Step 5: The DAB gives suggestions on the draft of departments Vision and Mission and submits it to Board of Studies (BOS) for review, instructions, and suggestions.

Composition of DAB:

Department Advisory Board (DAB) comprises Head of the Department, Professors, senior faculty members, one expert member from reputed institution, one industry expert and one Alumni,.

Step 6: After review and ratification by BOS, on approval of BOS the draft is sent to the Academic Council. If not approved then the entire process starts from Step 3.

Composition of BOS:

BOS is constituted with University nominated member, Head of the Department, three Academic council Nominee members, one industry nominee, 4 Professors, 2 associate professors and one PG student nominee.

Step 7: On Approval of the academic council, the vision and mission of the department are published and disseminated. If the academic council disapproves the entire process starts from step 1.

The process for defining department vision and mission are illustrated in the below Figure

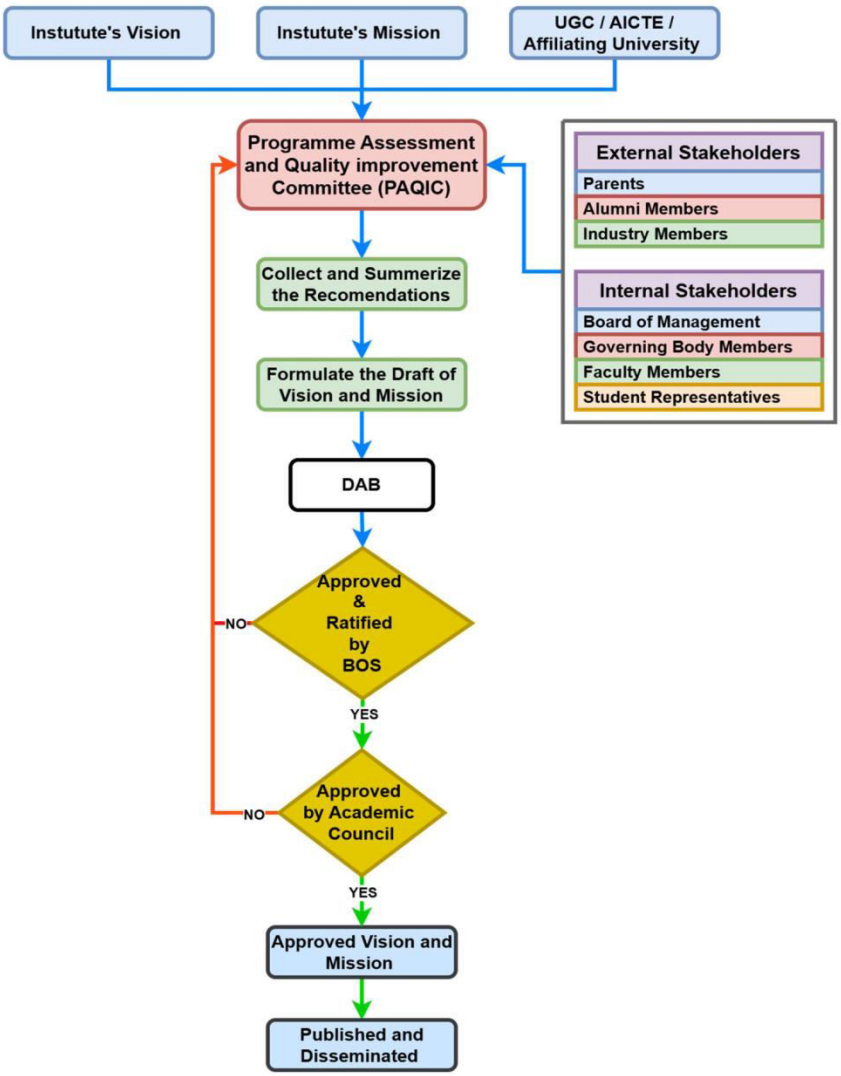

Figure.3.1Process for defining department vision and mission

B. Description of process involved in defining Programme Educational Objectives (PEOs) of the program:

Program Educational Objectives (PEOs) is a structured process that involves engaging key stakeholders such as students, alumni, faculty, employers, and industry experts. This collaborative approach ensures that the PEOs are relevant and aligned with both stakeholder expectations and the institutional vision and mission.

The process starts with collecting feedback through surveys and meetings, which is then used to draft the initial PEOs. These drafts undergo thorough review and refinement to ensure they meet the programs goals. Once finalized, the PEOs are approved by relevant academic bodies and disseminated through various channels to ensure widespread awareness and understanding.

This comprehensive approach ensures that the PEOs effectively prepare graduates to achieve their career and professional milestones.

Inputs Considered for Establishing PEOs:

1. Faculty Interaction:

Teaching faculty, especially course coordinators, play a crucial role in establishing PEOs. They are responsible for generating, modifying, and analyzing activities related to achieving course outcomes.

2. Alumni Feedback:

Alumni possess intimate knowledge of the program and significantly contribute to the assessment of PEOs. Feedback is gathered through alumni surveys and annual alumni meet.

3. Employer Feedback:

Employers provide valuable insights into the performance of graduates within the organization. This feedback is essential for aligning PEOs with industry expectations.

4. Statutory / Professional Bodies:

PEOs are aligned with the objectives of UGC / AICTE / Affiliating University. Professional societies assist in developing a model curriculum that meets industrial demands and program objectives.

5. Program Assessment and Quality Improvement Committee (PAQIC):

PAQIC collects feedback from stakeholders, reviews, and analyses it to ensure internal quality and achieve departmental goals.

6. Department Advisory Board (DAB):

Department Advisory Board (DAB) comprises Head of the Department, Professors, senior faculty members, one expert member from reputed institution, one industry expert and one Alumni. The DAB evaluates the programs effectiveness and proposes necessary changes

This process ensures that PEOs are relevant, comprehensive, and aligned with the needs of all stake holders.

7. Student Representatives:

Comprising the Student representatives (CR's) the DAB evaluates the program's effectiveness and identifies necessary changes based on their inputs.

Process for Defining Program Educational Objectives (PEOs)

Step 1: Foundation Establishment

Use the Vision and Mission of the institute and department, Graduate Attributes along with the guidelines specified by UGC/AICTE/ JNTUH, as the foundation.

Step 2: Draft Preparation

The Program Assessment and Quality Improvement Committee (PAQIC) formulates the draft of the departments PEOs by collecting and summarizing the recommendations from stakeholders.

Step 3: Review and Alignment

The Departmental Advisory Board (DAB) discuss the views to ensure alignment with the departments Vision, Mission and PEO's.

Step 4: Submission and Feedback

DAB submits the draft PEOs to the Board of Studies (BOS) for their review, necessary instructions, and suggestions. If not approved by BOS, the entire process is reinitiated from Step 2.

Step 5: Approval and Ratification

After the final review and ratification by BOS, PEOs are approved and published.

Step 6: Dissemination

The approved PEOs are published and disseminated.

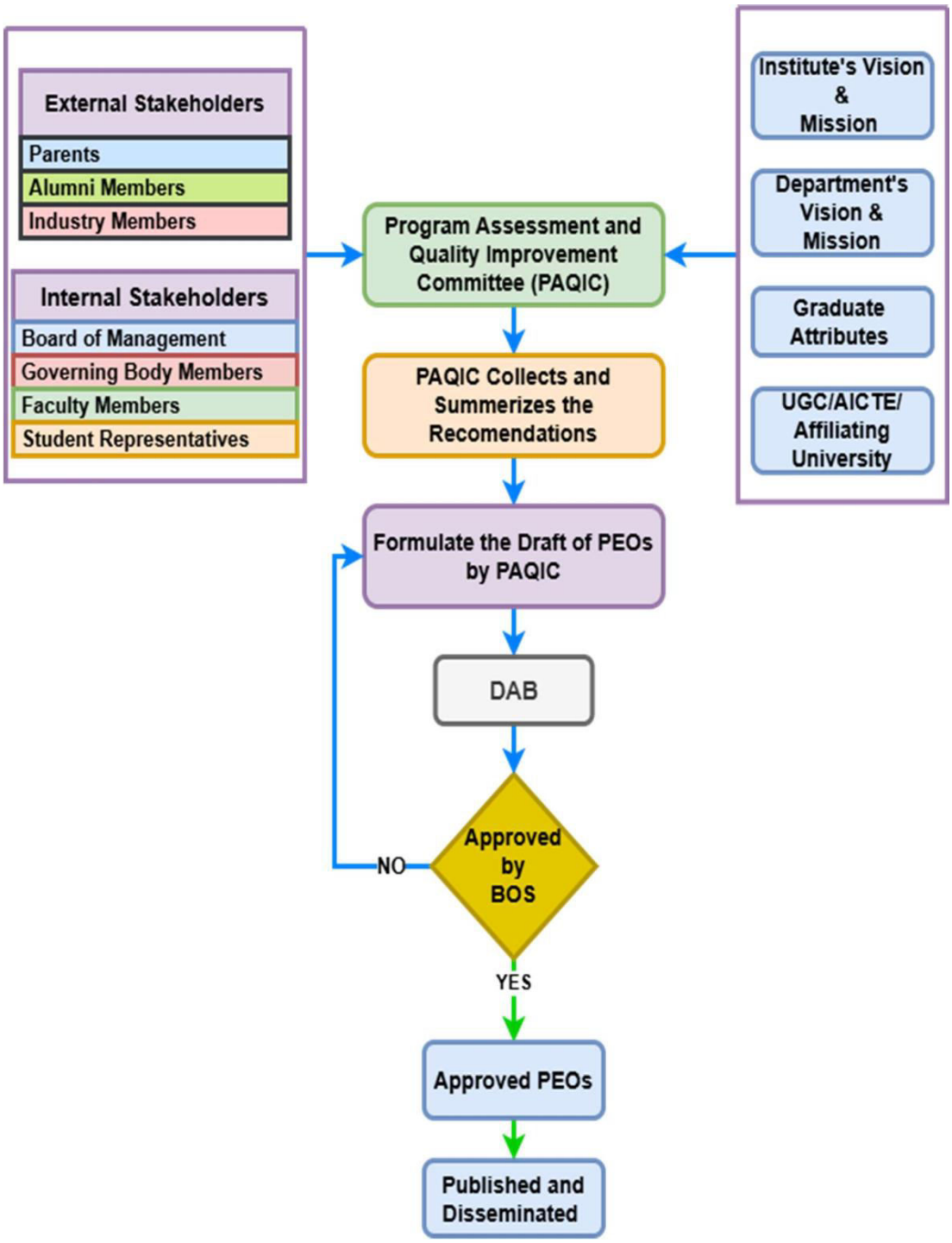

Figure: 3.2 Process to Define PEO's of the Department

PROGRAM EDUCATIONAL OBJECTIVES

PEO1 - Professional Development
To equip students with the ability to acquire knowledge of Mathematics, Science, Engineering, and Technology, applying it professionally within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, while upholding ethical responsibility.
PEO 2:Core Proficiency
To enable students to identify, formulate, comprehend, analyze, design, and solve engineering problems through hands-on experience in various technologies, utilizing modern tools essential for engineering practice and research to meet the needs of society and industry.
PEO 3: Technical Accomplishments
To equip students with the ability to design, simulate, experiment, analyze, optimize, and interpret core applications, harnessing their creativity and innovation through multidisciplinary concepts and contemporary learning to develop them as professional engineers
PEO4 - Professionalism
To provide training, exposure and awareness on importance of soft skills for better career and holistic personality development as well as professional attitude towards ethical issues, team work, responsibility, accountability, multidisciplinary approach and capability to relate engineering issues to broader social context.
PEO5 - Learning Environment
To provide students with an academic environment and make them aware of excellence, develop the urge of discovery, creativity, inventiveness, leadership, written ethical codes and guidelines and the life-long learning to become a successful professional in Electronics and Communication Engineering.

Mapping ofPEOswithMissionoftheDepartment:

3 - High, 2-Moderate, 1-Low

PEO Statements	M1	M2	M3
PEO1 - Professional Development	**3**	**2**	**3**
PEO2 - Core Proficiency	**3**	**3**	**3**
PEO3 - Technical Accomplishments	**3**	**2**	**2**
PEO4 – Professionalism	**3**	**2**	**3**
PEO5 - Learning Environment	**3**	**3**	**2**

PROGRAM OUTCOMES

- Program outcomes describe what students are expected to know and would be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire as they progress through the program.
- A Program Learning Outcome is broad in scope and be able to do at the end of the programme. POs are to be in line with the graduate attributes as specified in the Washington Accord. POs are to be specific, measurable and achievable. NBA has defined 12 POs and it is common for all the institutions in India.

PO1	**Engineering knowledge**	An ability to apply knowledge of mathematics (including probability, statistics and discrete mathematics), science, and engineering for solving Engineering problems and modeling
PO2	**Problem analysis**	An ability to design, simulate and conduct experiments, as well as to analyze and interpret data including hardware and software components
PO3	**Design / development of solutions**	An ability to design a complex electronic system or process to meet desired specifications and needs
PO4	**Conduct investigations of complex problems**	An ability to identify, formulate, comprehend, analyze, design synthesis of the information to solve complex engineering problems and provide valid conclusions.
PO5	**Modern tool usage**	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice
PO6	**The engineer and society**	An understanding of professional, health, safety, legal, cultural and social responsibilities
PO7	**Environment and sustainability**	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and demonstrate the knowledge need for sustainable development.
PO8	**Ethics**	Apply ethical principles, responsibility and norms of the engineering practice
PO9	**Individual and team work**	An ability to function on multi-disciplinary teams.
PO10	**Communication**	An ability to communicate and present effectively

PO11	**Project management and finance**	An ability to use the modern engineering tools, techniques, skills and management principles to do work as a member and leader in a team, to manage projects in multi-disciplinary environments
PO12	**Life-long learning**	A recognition of the need for, and an ability to engage in, to resolve contemporary issues and acquire lifelong learning

Relation between the Program Educational Objectives and the POs:

3 - High, 2-Moderate, 1-Low

PEO's → PO's ↓	PEO1 Professional Development	PEO2 Core Proficiency	PEO3 Technical Accomplishments	PEO4 Professionalism	PEO5 Learning Environment
PO1	**3**	**3**	**3**	**2**	**2**
PO2	**3**	**3**	**3**	**2**	**2**
PO3	**3**	**3**	**3**	**2**	**2**
PO4	**3**	**3**	**3**	**3**	**2**
PO5	**3**	**3**	**3**	**2**	**2**
PO6	**3**	**2**	**2**	**3**	**3**
PO7	**3**	**2**	**2**	**3**	**3**
PO8	**2**	**2**	**2**	**3**	**3**
PO9	**2**	**2**	**3**	**3**	**3**
PO10	**2**	**2**	**2**	**3**	**3**
PO11	**2**	**2**	**3**	**3**	**3**
PO12	**2**	**2**	**3**	**3**	**3**

PROGRAM SPECIFIC OUTCOMES

Program Specific Outcomes (PSOs): Program Specific Outcomes are statements that describe what the graduates of a specific engineering program should be able to do.A list of PSOs written for the department of Electronics and Communication Engineering is given below.

The graduates of the department will attain:

PSO1: The ability to analyze, design and implement application specific electronic system for complex engineering problems for analog, digital domain, communications and signal processing applications by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals.

PSO2: The ability to adapt for rapid changes in tools and technology with an understanding of societal and ecological issues relevant to professional engineering practice through life-long learning.

PSO3: Excellent adaptability to function in multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

Relation between the Program Educational Objectives and the PSOs:

PEO's → PO's ↓	PEO1 Professional Development	PEO2 Core Proficiency	PEO3 Technical Accomplishments	PEO4 Professionalism	PEO5 Learning Environment
PSO1	3	3	3	2	2
PSO2	3	3	3	3	2
PSO3	3	3	3	3	3

Dissemination Mechanism ofthePEO's, PO's & PSO's:

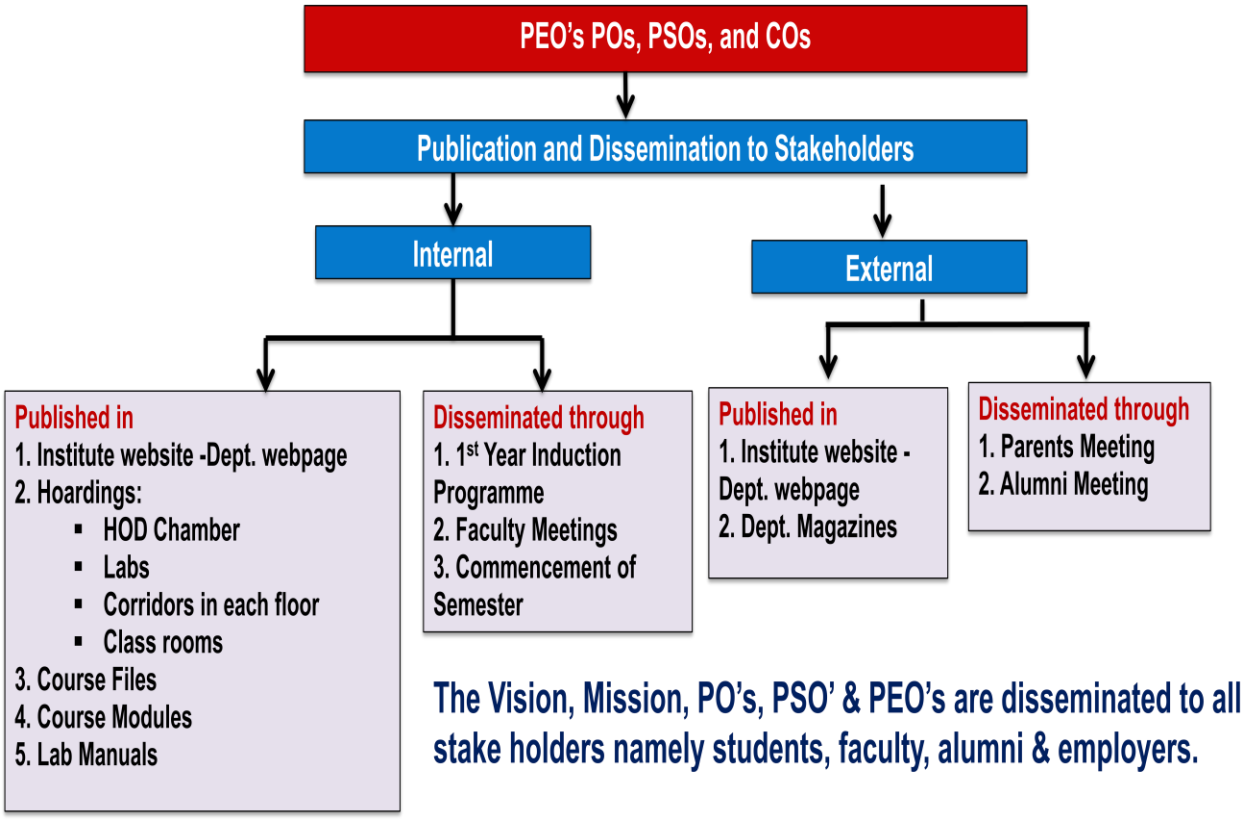

Figure: 3.3 Decimation mechanism of PEO's, PO's, PSO's & CO's

4. OBE FRAMEWORK OF THE DEPARTMENT

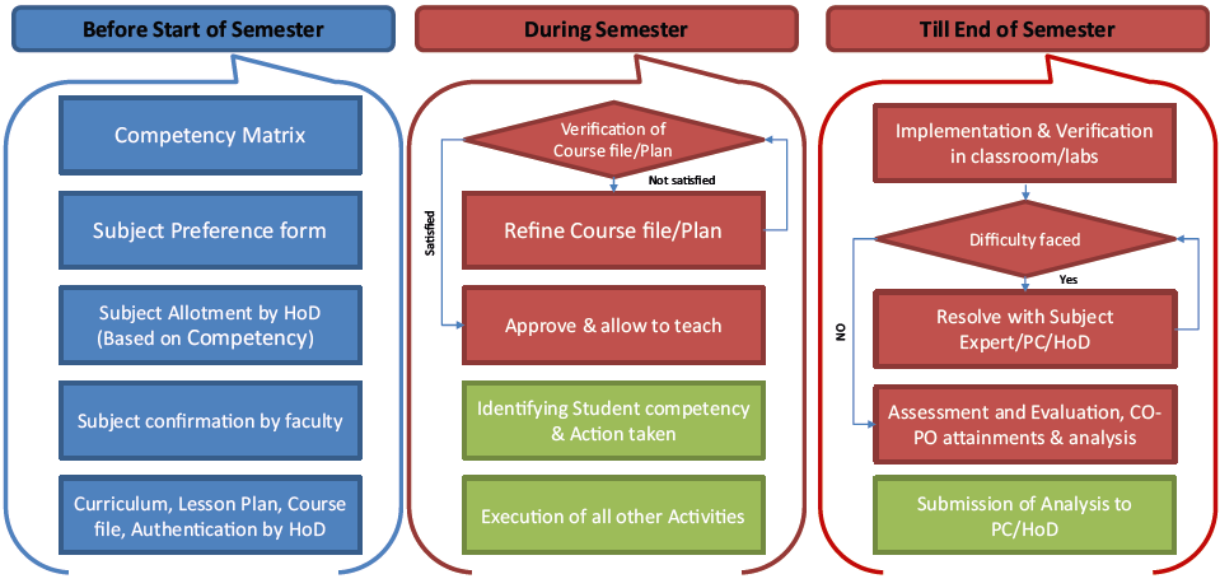

Figure: 4.1 OBE Frame Work of the Department

5. 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. It is most often used when designing educational, training, and learning processes.

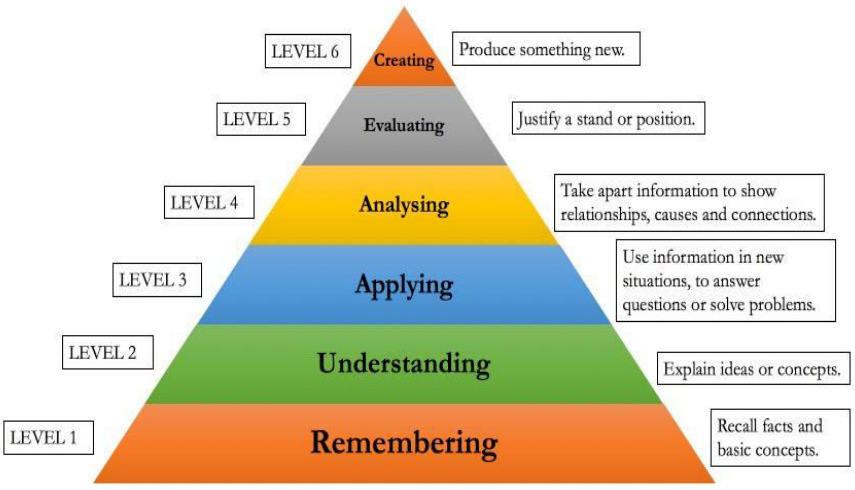

Fig. 5.1PictorialrepresentationofBloomsTaxonomy

Level 1, Remembering, is the most basic, requiring the least amount of cognitive rigour. This is about students recalling key information, for example, the meaning of a word.

Arrange | Define | Describe | List | Match | Name | Order | Recall | Reproduce

Level 2, Understanding, is to do with students demonstrating an understanding of the facts remembered. At this level, the student who recalls the definition of a word, for example, would also be able to show understanding of the word by using it in the context of different sentences.

Classify | Discuss | Explain | Identify | Report | Summarise

Level 3, Applying, is concerned with how students can take their knowledge and understanding, applying it to different situations. This usually involves students answering questions or solving problems.

Apply | Calculate | Demonstrate | Interpret | Show | Solve | Suggest

Level 4, Analysing, is about students being able to draw connections between ideas, thinking critically, to break down information into the sum of its parts.

Analyse | Appraise | Compare | Contrast | Distinguish | Explore | Infer | Investigate

Level 5, Evaluating, is reached when students can make accurate assessments or judgements about different concepts. Students can make inferences, find effective solutions to problems and justify conclusions, while drawing on their knowledge and understanding.

Argue | Assess | Critique | Defend | Evaluate | Judge | Justify

Level 6, Creating, is the ultimate aim of students' learning journey. At this final level of Bloom's taxonomy, students demonstrate what they have learnt by creating something new, either tangible or conceptual. This might include, for example, writing a report, creating a computer program, or revising a process to improve its results.

Compose | Construct| Create | Devise | Generate | Organise | Plan | Produce

6. GUIDELINES FOR WRITING COURSE OUTCOME STATEMENTS

Course Outcomes (COs) are specific, measurable statements that describe what learners are expected to know, understand, and be able to do by the end of a particular course. They are essential components of **Outcome Based Education (OBE)** and serve as the foundation for assessing student performance and course effectiveness.

Characteristics of Good Course Outcomes:

1. **Specific**: Clearly defines what students will achieve at the end of the course.
2. **Measurable**: Allows the assessment of student achievement through tests, assignments, and projects.
3. **Achievable**: Realistic and achievable within the course duration.
4. **Relevant**: Aligned with the broader Program Outcomes (POs) and institutional goals.
5. **Time-bound**: Must be completed by the end of the course.

Guidelines for Writing Effective Course Outcomes:

1.Use Action Verbs: Course outcomes should begin with action verbs that are observable and measurable. The **Bloom's Taxonomy** framework is often used to structure COs. Examples include:

- **Remembering**: Define, list, name
- **Understanding**: Explain, describe, summarize
- **Applying**: Solve, use, implement
- **Analyzing**: Compare, differentiate, organize
- **Evaluating**: Assess, justify, critique
- **Creating**: Design, formulate, construct

2.Focus on Student Learning: Outcomes should describe what the student will learn, not what the teacher will cover. For example:

- **Not ideal**: "Teach students how to apply machine learning algorithms."
- **Better**: "Students will be able to apply machine learning algorithms to real-world data."

3.Limit the Number: Typically, 4–6 well-written COs are sufficient for most courses. Each CO should cover a significant aspect of the course without being too broad.

4.Align with Program Outcomes: COs should contribute to the broader **Program Outcomes (POs)** and **Program Educational Objectives (PEOs)**. Mapping the COs to the POs helps ensure that the course supports the overall program's objectives.

5.Make Outcomes Attainable: Consider the course duration, student capabilities, and resources when writing COs. Avoid overly ambitious or abstract outcomes.

6.Assessable: Ensure that the outcome can be measured through appropriate assessment methods (exams, projects, presentations, or lab work).

Course Outcomes for Electronic Devices and Circuits:

COURSE OUTCOMES		BTL
CO1	**Understand** the qualitative theory, properties, and behavior of P-N junction diodes, including their Breakdown mechanisms and diode equation.	**Understand**
CO2	**Understand** the characteristics and operation of special purpose diodes, such as photodiodes, varactor diodes, tunnel diodes, and SCR, at a high level.	**Understand**
CO3	**Analyze** different kinds of rectifier circuits and filters, evaluating their harmonic content and voltage control ability	**Analyze**
CO4	**Apply** various stabilizing and biasing techniques to BJTs at a high level while investigating how they affect thermal stability.Analyze the designand functionality of BJTs by examining their configurations and computing important parameters.	**Apply**
CO5	**Analyze**single-stage transistor amplifiers in-depth and at an elevated level. Use the H-Parameter Model to compare performance metrics between configurations	**Analyze**
CO6	**Examine** the performance of FETs as voltage-variableresistors and contrast their characteristics to Bipolar Junction Transistors (BJTs).	**Analyze**

Table 6.1: CO-PO Mapping

7. CO-PO/PSO COURSE ARTICULATION MATRIX (CAM) MAPPING:

Course Articulation Matrix shows the educational relationship (Level of Learning achieved) between course outcomes and program outcomes for a course. This matrix strongly indicates whether the students are able to achieve the course learning objectives. The matrix can be used for any course and is a good way to evaluate a course syllabus. The table gives information about the action verbs used in the POs and the nature of POs, stating whether the POs are technical or non-technical. You need to understand the intention of each POs and the Bloom's level to which each of these action verbs in the POs correlates to. Once you have understood the POs then you can write the COs for a course and see to what extent each of those CO's correlate with the POs.

<table>
<tr><th>Type</th><th>POs</th><th>Action Verb(s) in POs</th><th>Bloom's level(s) for POs</th><th>Bloom's level(s) for COs</th></tr>
<tr><td rowspan="12">Technical</td><td>PO1</td><td>Apply</td><td>L3</td><td rowspan="12">Bloom's L1 to L4 for theory courses.
Bloom's L1 to L5 for laboratory courses.
Bloom's L1 to L6 for project work, experiential learning</td></tr>
<tr><td rowspan="3">PO2</td><td>Identify</td><td>L2</td></tr>
<tr><td>Formulate</td><td>L6</td></tr>
<tr><td>Review</td><td>L2</td></tr>
<tr><td rowspan="2">PO3</td><td>Design</td><td>L6</td></tr>
<tr><td>Develop</td><td>L3, L6</td></tr>
<tr><td rowspan="3">PO4</td><td>Analyse</td><td>L4</td></tr>
<tr><td>Interpret</td><td>L2, L3</td></tr>
<tr><td>Design</td><td>L6</td></tr>
<tr><td rowspan="3">PO5</td><td>Create</td><td>L6</td></tr>
<tr><td>Select</td><td>L1, L2, L6</td></tr>
<tr><td>Apply</td><td>L3</td></tr>
<tr><td rowspan="7">Non-Technical</td><td>PO6</td><td colspan="3" rowspan="7">Thumb Rule:
If Bloom's L1 Action Verbs of a CO: Correlates with any of PO6 to PO12, then assign 1.
If Bloom's L2 to L3 Action Verbs of a CO: Correlates with any of PO6 to PO12, then assign 2.
If Bloom's L4 to L6 Action Verbs of a CO: Correlates with any of PO6 to PO12, then assign 3</td></tr>
<tr><td>PO7</td></tr>
<tr><td>PO8</td></tr>
<tr><td>PO9</td></tr>
<tr><td>PO10</td></tr>
<tr><td>PO11</td></tr>
<tr><td>PO12</td></tr>
</table>

Table 7.1: Process for mapping the values for CO-PO Matrix

NOTE:

1. The first five POs are purely of technical in nature, while the other POs are non-technical.
2. For the theory courses, while writing the COs, you need to restrict yourself between Blooms Level 1 to Level 4. Again, if it is a programming course, restrict yourself between Blooms Level 1 to Level 3 but for the other courses, you can go up to Blooms Level 4.

3. For the laboratory courses, while composing COs, you need to restrict yourself between Blooms Level 1 to Level 5.
4. Only for Mini-project and Main project, you may extend up to Blooms Level 6 while composing COs.
5. For a given course, the course in-charge has to involve all the other Professors who teach that course and ask them to come up with the CO-PO mapping. The course in-charge has to take the average value of all of these CO-PO mappings and finalize the values or the course in-charge can go with what the majority of the faculty members prefer for. Ensure that none of the Professors who are handling the particular course discuss with each other while marking the CO-PO values.
6. If you want to match your COs with non-technical POs, then correlate the action verbs used in the course COs with the thumb rule given in the table and map the values. (Applies only for mapping COs to non-technical POs).

Method for Articulation:

1. Identify the key competencies of POs/PSOs to each CO and make a corresponding mapping table with assigning mark at the corresponding cell. One observation to be noted is that the first five POs are purely of technical in nature, while the other POs are non-technical.

2. Justify each CO - PO/PSO mapping with a justification statement and recognize the number of vital features mentioned in the justification statement that are matching with the given Key Attributes for Assessing Program Outcomes. Use a combination of words found in the COs, POs//PSOs and your course syllabus for writing the justification.

3. Make a table with number of key competencies for CO – PO/PSO mapping with reference to the maximum given Key Attributes for Assessing Program Outcomes.

4. Make a table with percentage of key competencies for CO – PO/PSO mapping with reference to the maximum given Key Attributes for Assessing Program Outcomes.

5. Finally, Course Articulation Matrix (CO - PO / PSO Mapping) is prepared with COs and POs and COs and PSOs on the scale of 0 to 3, 0 being no correlation (marked with " - "), 1 being the low/slight correlation, 2 being medium/moderate correlation and 3 being substantial/high correlation based on the following strategy

0–0 ≦ C ≦ 5% - No correlation.

1−5 < C ≦ 40% - Low / Slight.

2−40% < C < 60% - Moderate

3−60% ≦ C < 100% - Substantial / High

Key Competencies for Assessing Program Outcomes:

Program Outcomes – Competencies

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.(No. of Competencies = 4)

1.1 Demonstrate competence in mathematical modelling

1.2 Demonstrate competence in basic sciences

1.3 Demonstrate competence in engineering fundamentals

1.4 Demonstrate competence in specialized engineering knowledge to the program

PO 2: Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. (No. of Competencies = 4)

2.1 Demonstrate an ability to identify and formulate complex engineering problem

2.2 Demonstrate an ability to formulate a solution plan and methodology for an engineering problem

2.3 Demonstrate an ability to formulate and interpret a model

2.4 Demonstrate an ability to execute a solution process and analyze results

PO 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 public health and safety, and cultural, societal, and environmental considerations(No. of Competencies = 4)

3.1 Demonstrate an ability to define a complex/ open-ended problem in engineering terms

3.2 Demonstrate an ability to generate a diverse set of alternative design solutions

3.3 Demonstrate an ability to select an optimal design scheme for further development

3.4 Demonstrate an ability to advance an engineering design to defined end state

PO 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. (No. of Competencies = 3)

4.1 Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding

4.2 Demonstrate an ability to design experiments to solve open-ended problems

4.3 Demonstrate an ability to analyze data and reach a valid conclusion

PO 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.(No. of Competencies = 3)

5.1 Demonstrate an ability to identify/ create modern engineering tools, techniques and resources

5.2 Demonstrate an ability to select and apply disciplinespecific tools, techniques and resources

5.3 Demonstrate an ability to evaluate the suitability and limitations of tools used to solve an engineering problem

PO 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.(No. of Competencies = 2)

6.1 Demonstrate an ability to describe engineering roles in a broader context, e.g. pertaining to the environment, health, safety, legal and public welfare

6.2 Demonstrate an understanding of professional engineering regulations, legislation and standards

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.(No. of Competencies = 2)

7.1 Demonstrate an understanding of the impact of engineering and industrial practices on social, environmental and in economic contexts

7.2 Demonstrate an ability to apply principles of sustainable design and development

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.(No. of Competencies = 2)

8.1 Demonstrate an ability to recognize ethical dilemmas

8.2 Demonstrate an ability to apply the Code of Ethics

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.(No. of Competencies = 3)

9.1 Demonstrate an ability to form a team and define a role for each member

9.2 Demonstrate effective individual and team operations-- communication, problemsolving, conflict resolution and leadership skills

9.3 Demonstrate success in a team-based project

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with the 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(No. of Competencies = 3)

10.1 Demonstrate an ability to comprehend technical literature and document project work

10.2 Demonstrate competence in listening, speaking, and presentation

10.3 Demonstrate the ability to integrate different modes of communication

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments.(No. of Competencies = 3)

11.1 Demonstrate an ability to evaluate the economic and financial performance of an engineering activity

11.2 Demonstrate an ability to compare and contrast the costs/benefits of alternate proposals for an engineering activity

11.3 Demonstrate an ability to plan/manage an engineering activity within time and budget constraints

PO 12: Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.(No. of Competencies = 3)

12.1 Demonstrate an ability to identify gaps in knowledge and a strategy to close these gaps

12.2 Demonstrate an ability to identify changing trends in engineering knowledge and practice

12.3Demonstrate an ability to identify and access sources for new information

PSO1: The ability to analyze, design and implement application-specific electronic systems for complex engineering problems for analog, digital domain, communications, and signal processing applications by applying the knowledge of basic sciences, engineering mathematics, and engineering fundamentals. (No. of Competencies = 3)

1.1. Demonstrate the ability to analyze complex engineering problems in the domains of analog, digital, communications, and signal processing systems.

1.2. Demonstrate proficiency in designing and implementing application-specific electronic systems by applying knowledge of engineering fundamentals, basic sciences, and mathematics.

1.3. Demonstrate the capability to select and apply appropriate methodologies and tools to solve real-world problems in electronics and communications.

PSO2: The ability to adapt for rapid changes in tools and technology with an understanding of societal and ecological issues relevant to professional engineering practice through life-long learning. (No. of Competencies = 3)

2.1. Demonstrate adaptability to new tools and emerging technologies in response to rapid changes in the engineering field.

2.2. Demonstrate an understanding of the societal and ecological implications of engineering solutions, ensuring responsible and sustainable practices.

2.3. Demonstrate a commitment to life-long learning for staying current with technological advancements and evolving industry standards.

PSO3: Excellent adaptability to function in a multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities. (No. of Competencies = 3)

3.1. Demonstrate effective teamwork and leadership skills while functioning in multi-disciplinary environments, collaborating with professionals from various fields.

3.2. Demonstrate strong interpersonal communication and problem-solving abilities in diverse team settings.

3.3. Demonstrate an appreciation for professional ethics and societal responsibilities in engineering practice, contributing positively to society.

SAMPLE EXPLANATION:

COURSE NAME: SIGNALS & SYSTEMS

I. COURSE OVERVIEW:

The **Signals & Systems** course offers a comprehensive introduction to the representation, analysis, and transformation of both continuous and discrete signals. Students will learn to decompose arbitrary signals using orthogonal functions, enabling efficient representation and manipulation. The course delves into the Fourier transform, providing essential tools for analyzing signals in the frequency domain. It further explores the properties and applications of Linear Time-Invariant (LTI) systems, including convolution techniques. Additionally, the course covers the Laplace and Z-transforms, equipping students with the ability to determine Regions of Convergence (ROC) and understand the connections between these transforms and the Fourier transform. By the end of the course, students will have a strong foundation in signal transformation techniques, preparing them for more advanced studies in signal processing and system analysis.

II. COURSE PRE-REQUISITES:

- Basic Calculus
- Linear Algebra
- Differential Equations
- Basic Complex Numbers

III. MARKS DISTRIBUTION:

Mode	Marks
Internal Examination	**30**
PPT/Case Study	**5**
Assignment	**5**
External Examination	**60**
Total	**100**

Table7.2: Process for marks distribution in examination

IV. COURSE OBJECTIVES:

	COURSE OBJECTIVE STATEMENTS
1	To Represent any arbitrary signals in terms of complete sets of orthogonal functions
2	To understand Fourier transform for an arbitrary signal and properties
3	To Analyze about LTI System and compute Convolution
4	To determine Laplace transform, properties and ROC of L.T for a given signal & system and also relation between L.T &F.T
5	To determine Z transform, properties and ROC of Z.T for a given signal & system and also relation between Z.T &F.T

Table 7.3: Course objectives of subject

V. COURSE OUTCOMES:

COURSE OUTCOME STATEMENTS		BTL
CO1	**Classify** various signal types (e.g., continuous, discrete) and **perform** fundamental operations to interpret and manipulate signal characteristics.	**BTL-3,4**
CO2	**Analyze** signals using orthogonal functions and vector spaces, and demonstrate Fourier series and transform applications for both periodic and non-periodic signals.	**BTL-4**
CO3	**Apply** the Fourier Transform to transition between time and frequency domains, **Analyze** signal properties such as bandwidth, sampling, aliasing, and reconstruction.	**BTL-3,4**
CO4	**Examine** signal behavior through linear time-invariant (LTI) systems, assessing conditions for distortion less transmission and **understanding** filter characteristics.	**BTL-4**
CO5	**Utilize** the Laplace Transform for complex signal analysis and relate it to the Fourier Transform in solving real-world signal processing problems.	**BTL-3**
CO6	**Interpret** discrete-time systems through Z-transforms, **compare** it with other transforms, and apply it to practical discrete-time signal problems.	**BTL-2,4**

Table 7.4: Course outcomes of subject

VI. PROGRAM OUTCOMES-Pos

PO1	**Engineering knowledge**	An ability to apply knowledge of mathematics (including probability, statistics and discrete mathematics), science, and engineering for solving Engineering problems and modeling
PO2	**Problem analysis**	An ability to design, simulate and conduct experiments, as well as to analyze and interpret data including hardware and software components
PO3	**Design / development of solutions**	An ability to design a complex electronic system or process to meet desired specifications and needs
PO4	**Conduct investigations of complex problems**	An ability to identify, formulate, comprehend, analyze, design synthesis of the information to solve complex engineering problems and provide valid conclusions.
PO5	**Modern tool usage**	An ability to use the techniques, skills and modern engineering tools necessary for engineering practice
PO6	**The engineer and society**	An understanding of professional, health, safety, legal, cultural and social responsibilities
PO7	**Environment and sustainability**	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and demonstrate the knowledge need for sustainable development.
PO8	**Ethics**	Apply ethical principles, responsibility and norms of the engineering practice
PO9	**Individual and team work**	An ability to function on multi-disciplinary teams.
PO10	**Communication**	An ability to communicate and present effectively
PO11	**Project management and finance**	An ability to use the modern engineering tools, techniques, skills and management principles to do work as a member and leader in a team, to manage projects in multi-disciplinary environments
PO12	**Life-long learning**	A recognition of the need for, and an ability to engage in, to resolve contemporary issues and acquire lifelong learning

VII. PROGRAMME SPECIFIC OUTCOMES-PSO's:

PSO1: The ability to analyze, design and implement application-specific electronic systems for complex engineering problems for analog, digital domain, communications, and signal processing applications by applying the knowledge of basic sciences, engineering mathematics, and engineering fundamentals.

PSO2: The ability to adapt for rapid changes in tools and technology with an understanding of societal and ecological issues relevant to professional engineering practice through life-long learning.

PSO3: Excellent adaptability to function in a multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

VIII. MAPPING OF EACH CO WITH PO'S, PSO'S (Use Tick Mark)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	✓	✓	✓	✓									✓		
CO2	✓	✓	✓	✓									✓		
CO3	✓	✓	✓	✓									✓		
CO4	✓	✓	✓	✓									✓		
CO5	✓	✓	✓	✓									✓		
CO6	✓	✓	✓	✓									✓		

Table 7.5: CO-PO Mapping along with PSO

IX. JUSTIFICATION FOR CO-PO/PSO MAPPING:

Course Outcome	PO/PSO	Justification for Mapping	No. of Key competencies matched
CO1	PO1	Classification of signals and fundamental operations covers mathematical modeling, basic sciences, engineering fundamentals, engineering knowledge to the program	4
	PO2	Fundamental Operations on signals can formulate complex engineering problem, formulate a solution plan and methodology for an engineering problem, execute a solution process and analyze result	3
	PO3	Fundamental Operations on signals can define a complex/ open-ended problem in engineering terms; generate a diverse set of alternative design solutions.	2
	PO4	Fundamental Operations on signals can perform investigations of technical issues, and analyze data and provide a valid conclusion	2
	PSO1	Classification of signals and fundamental operations can analyze	3

		complex engineering problems in the domains of analog, digital, communications, and signal processing systems, designing and implementing application-specific electronic systems, select and apply appropriate methodologies and tools to solve real-world problems in electronics and communications	
CO2	**PO1**	Orthogonal Analysis and Fourier Series covers mathematical modeling, basic sciences, engineering fundamentals, engineering knowledge to the program	4
	PO2	Orthogonal Analysis and Fourier Series covers formulate complex engineering problem, formulate a solution plan and methodology for an engineering problem, execute a solution process and analyze result	4
	PO3	Orthogonal Analysis and Fourier Series covers define a complex/ open-ended problem in engineering terms, generate a diverse set of alternative design solutions.	2
	PO4	Orthogonal Analysis and Fourier Series covers investigations of technical issues, and analyze data and provide a valid conclusion	2
	PSO1	Orthogonal Analysis and Fourier Series can analyze complex engineering problems in the domains of analog, digital, communications, and signal processing systems, designing and implementing application-specific electronic systems, select and apply appropriate methodologies and tools to solve real-world problems in electronics and communications	3
CO3	**PO1**	Applying Fourier Transform covers mathematical modeling, basic sciences, engineering fundamentals, engineering knowledge to the program	4
	PO2	Applying Fourier Transform formulate complex engineering problem, formulate a solution plan and methodology for an engineering problem, execute a solution process and analyze result	4
	PO3	Fourier transform and properties can define a complex/ open-ended problem in engineering terms, generate a diverse set of alternative design solutions, select an optimal design scheme for further development.	3
	PO4	Applying Fourier Transform to real time signals and evaluation of signal properties can do investigations of technical issues, analyze data and provide a valid conclusion	2
	PSO1	Applying Fourier Transform to real time signals and evaluation of signal properties can analyze complex engineering problems in the domains of analog, digital, communications, and signal processing systems, designing and implementing application-specific electronic systems, select and apply appropriate methodologies and tools to solve real-world problems in electronics and communications	3
CO4	**PO1**	Examine signal behavior through linear time-invariant (LTI) systems covers mathematical modeling, basic sciences, engineering fundamentals, engineering knowledge to the program	4

	PO2	LTI System analysis can formulate complex engineering problem, formulate a solution plan and methodology for an engineering problem, execute a solution process and analyze result	4
	PO3	LTI System and compute Convolution define a complex/ open-ended problem in engineering terms, generate a diverse set of alternative design solutions, and select an optimal design scheme for further development.	3
	PO4	LTI System analysis can do investigations of technical issues, design experiments to solve open-ended problems, analyze data and provide a valid conclusion	3
	PSO1	LTI System analysis can analyze complex engineering problems in the domains of analog, digital, communications, and signal processing systems, designing and implementing application-specific electronic systems, select and apply appropriate methodologies and tools to solve real-world problems in electronics and communications	3
CO5	**PO1**	Laplace Transform for complex signal analysis covers mathematical modeling, basic sciences, engineering fundamentals, engineering knowledge to the program	4
	PO2	Laplace transform and properties formulate complex engineering problem, formulate a solution plan and methodology for an engineering problem, execute a solution process and analyze result	4
	PO3	Laplace transform and properties can define a complex/ open-ended problem in engineering terms, generate a diverse set of alternative design solutions, select an optimal design scheme for further development.	3
	PO4	Laplace transform and properties can do investigations of technical issues, analyze data and provide a valid conclusion	2
	PSO1	Laplace transform and properties can analyze complex engineering problems in the domains of analog, digital, communications, and signal processing systems, designing and implementing application-specific electronic systems, select and apply appropriate methodologies and tools to solve real-world problems in electronics and communications	3
CO6	**PO1**	Determine Z transform, properties and ROC of Z.T for a given signal & system and also relation between Z.T & F.T covers mathematical modeling, basic sciences, engineering fundamentals, engineering knowledge to the program	4
	PO2	Z transform and properties formulate complex engineering problem, formulate a solution plan and methodology for an engineering problem, execute a solution process and analyze result	4
	PO3	Z transform and properties can define a complex/ open-ended problem in engineering terms, generate a diverse set of alternative design solutions, select an optimal design scheme for further development.	3

	PO4	Z transform and properties investigations of technical issues, analyze data and provide a valid conclusion	2
	PSO1	Z transform and properties can analyze complex engineering problems in the domains of analog, digital, communications, and signal processing systems, designing and implementing application-specific electronic systems, select and apply appropriate methodologies and tools to solve real-world problems in electronics and communications	3

Table 7.6: CO-PO Mapping along with PSO Justification

X. TOTAL COUNT OF KEY COMPETENCIES FOR CO-PO/PSO MAPPING:

	Program Outcomes(PO)												**Program Specific Outcomes(PSO)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**4**	**3**	**2**	**2**									**3**		
CO2	**4**	**4**	**2**	**2**									**3**		
CO3	**4**	**4**	**3**	**2**									**3**		
CO4	**4**	**4**	**3**	**3**									**3**		
CO5	**4**	**4**	**3**	**2**									**3**		
CO6	**4**	**4**	**3**	**2**									**3**		

Table 7.7: CO-PO key competencies

XI. PERCENTAGE OF KEY COMPETENCIES FOR CO-PO/PSO MAPPING

	Program Outcomes(PO)												**Program Specific Outcomes(PSO)**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**100**	**75**	**50**	**66.67**									**100**		
CO2	**100**	**100**	**50**	**66.67**									**100**		
CO3	**100**	**100**	**75**	**66.67**									**100**		
CO4	**100**	**100**	**75**	**100**									**100**		
CO5	**100**	**100**	**75**	**66.67**									**100**		
CO6	**100**	**100**	**75**	**66.67**									**100**		

Table 7.7: CO-PO key competencies percentage

XII. COURSE ARTICULATION MATRIX (PO/PSO MAPPING)

CO'S and PO'S and CO'S and PSO'S on the scale of 0 to 3,0 being no correlation,1 being the low correlation, 2 being medium correlation and 3 being high correlation.

0 – No correlation(C<5%), 1 - Low/Slight (5%<=C<=49%)

2 – Moderate (50%<=C<=69%), 3 - Substantial/High(C>=70%)

	Program Outcomes(PO)												Program Specific Outcomes(PSO)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2									3		
CO2	3	3	2	2									3		
CO3	3	3	3	2									3		
CO4	3	3	3	3									3		
CO5	3	3	3	2									3		
CO6	3	3	3	2									3		
Avg.	3	3	2.66	2.16									3		

Table 7.8: CO-PO Course Articulation Process

8. STRUCTURED APPROACH TO CO-PO MAPPING AND CONTINUOUS IMPROVEMENT

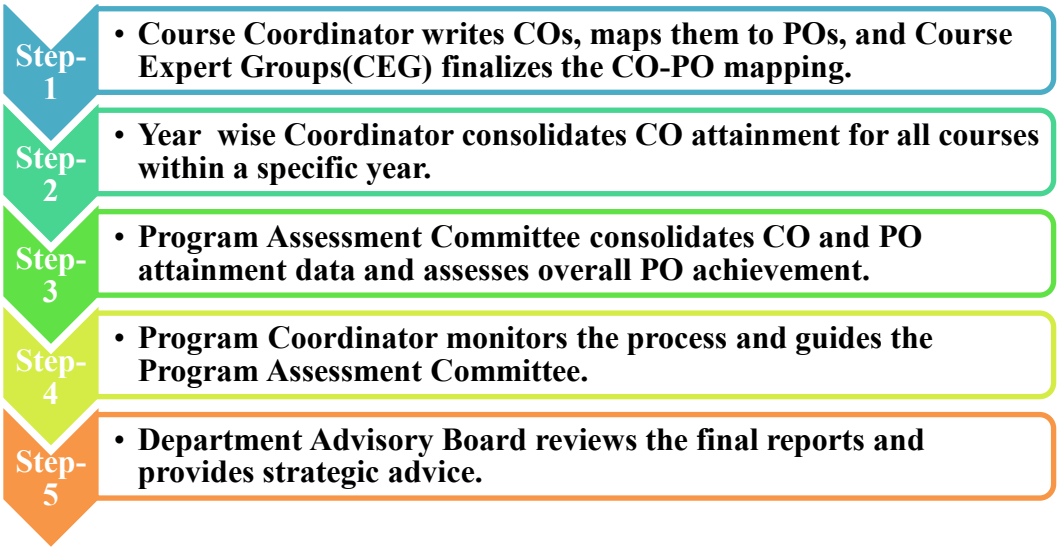

Table 8.1: CO-PO mapping for continuous Improvement

1. Course Coordinator (CO-PO Mapping)

Role: The Course Coordinator is the foundational role in this process. They are responsible for writing appropriate Course Outcomes (COs) for the course they oversee.

Task: The Course Coordinator ensures that the COs are properly mapped to the **Program Outcomes (POs)** by identifying how each CO contributes to the achievement of various POs. This involves using a CO-PO mapping matrix to determine the level of contribution (low, medium, high) of each CO to each PO.

Finalization: Once the CO-PO mapping is complete, the Course Experts Group finalizes the mapping and prepares the relevant documents for submission to the Year-Wise Coordinator.

2. Year-Wise Coordinator (Consolidation of CO Attainment)

Role: The Year-Wise Coordinator is responsible for consolidating the CO attainment for all courses offered in a particular academic year.

Task: They collect and compile CO attainment data from each Course Coordinator. This typically involves calculating the average CO attainment for each course based on student performance data (exams, assignments, projects) and ensuring that all course-specific CO attainment is accurately reported.

Output: The consolidated CO attainment for each year is then submitted to the **Program Assessment Committee**.

3. Program Assessment Committee (CO & PO Attainment Consolidation)

Role: The Program Assessment Committee is responsible for consolidating both the **CO attainment** and **PO attainment** for the entire program.

Task: This step involves taking the CO attainment data provided by the Year-Wise Coordinators and mapping it to the Program Outcomes (POs). The committee analyzes how well the COs contribute to the achievement of the POs, based on the CO-PO mapping matrix created by the Course Coordinators.

PO Attainment: The committee ensures that the CO-PO mappings are used to calculate overall PO attainment for the program. The attainment levels (often expressed as percentages) are used to determine how well the program's learning outcomes are being met.

Feedback: If necessary, the committee may provide feedback on improving CO-PO alignment or suggest changes to COs to better meet PO targets.

4. Program Coordinator (Monitoring & Guidance)

Role: The Program Coordinator oversees the entire process and provides guidance to the Program Assessment Committee.

Task: They monitor the attainment levels of COs and POs and ensure that the assessment methods are in line with the program's educational objectives. The Program Coordinator may intervene if there are gaps between the expected and achieved outcomes.

Strategic Role: They ensure the continuous improvement of the program by suggesting updates to the curriculum, teaching methods, or assessment tools based on CO and PO attainment data.

5. Department Advisory Board (Oversight)

Role: The Department Advisory Board provides high-level oversight of the entire process.

Task: They review the CO and PO attainment reports and offer strategic advice on how the program can evolve to better meet industry standards, societal needs, and academic goals. They may also recommend adjustments to the learning outcomes or suggest additional resources to improve the overall educational experience.

Final Review: The Advisory Board ensures that the program aligns with both internal and external benchmarks, contributing to the program's continuous improvement and relevance in the field.

9. CO-PO/PSO ASSESSMENT PROCESS& TOOLS:

A. ASSESSMENT PROCESSES

Course outcomes are evaluated based on two approaches namely direct and indirect assessment methods. The direct assessment methods are based on the Continuous Internal Assessment (CIA) and Semester End Examination (SEE) whereas the indirect assessment methods are based on the course end survey which will be taken after completion of the course.

In the assessment process for course outcomes, each course is mapped to specific course outcomes and program outcomes & program specific outcomes with designated weight. The students' performance in these courses is then analyzed in detail to assess the degree of Program Outcome/Program Specific attainment.

For all courses, performance is evaluated based on marks obtained in Continuous Internal Assessment (CIA) and Semester End Examinations (SEE). CIA exams are held twice per semester, while the SEE is conducted at the end of the semester.

Weightage for CO Attainment

Assessment Method	Assessment Tool	Weightage in CO Attainment
Direct Assessment	Continuous Internal Assessment(CIA)	**80%**
	Semester End Examination (SEE)	
Indirect Assessment	Course End Survey	**20%**

Table 8.2: Weightage for CO Attainment

The attainment of Course Outcomes (COs) is systematically determined through a **Question-wise Analysis** approach. The process begins with calculating the class average marks for a subject, which is then converted into a target percentage. This target is applied to the maximum marks of each question to establish specific benchmark values for attainment. Each question is mapped to relevant Course Outcomes, ensuring a direct link between assessments and learning objectives. Student performance is evaluated against these targets, and the attainment for each question is aggregated based on the CO mapping. Finally, the calculated CO attainment values are integrated into Program Outcomes (POs) and Program Specific Outcomes (PSOs), providing comprehensive evaluation that aligns course-level assessments with broader program-level goals.

RUBRICS FOR CO ATTAINMENT

R24/R22 REGULATION

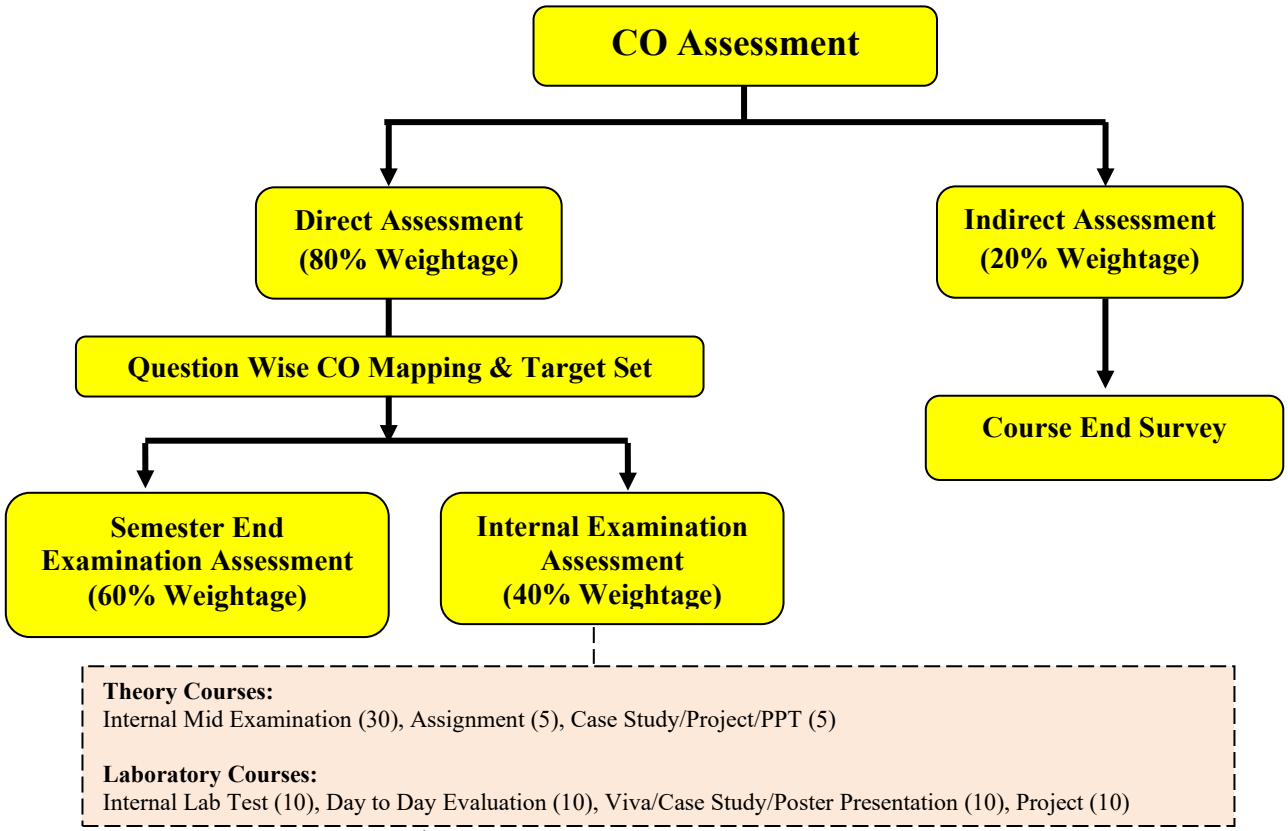

Fig 8.1: RUBRICS FOR CO ATTAINMENT

R20/R18 REGULATION

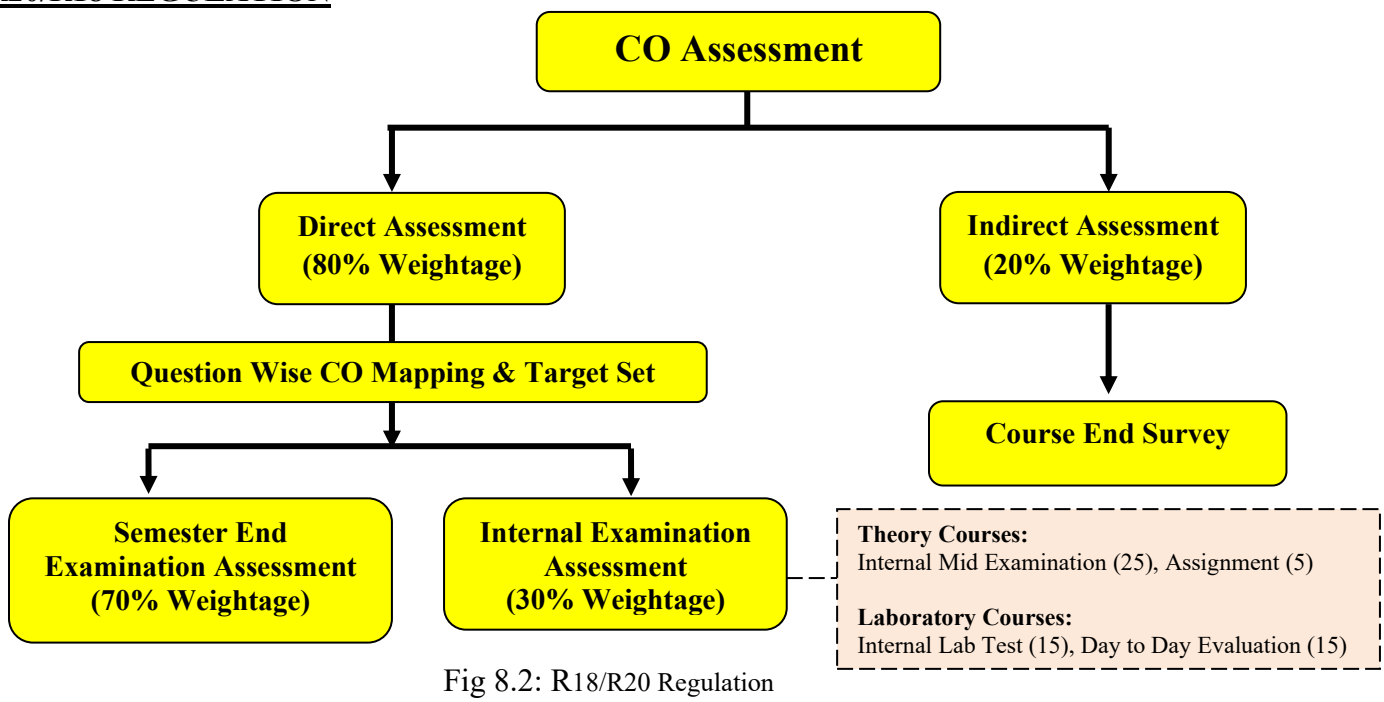

Fig 8.2: R18/R20 Regulation

CO Assessment and Attainment Process:

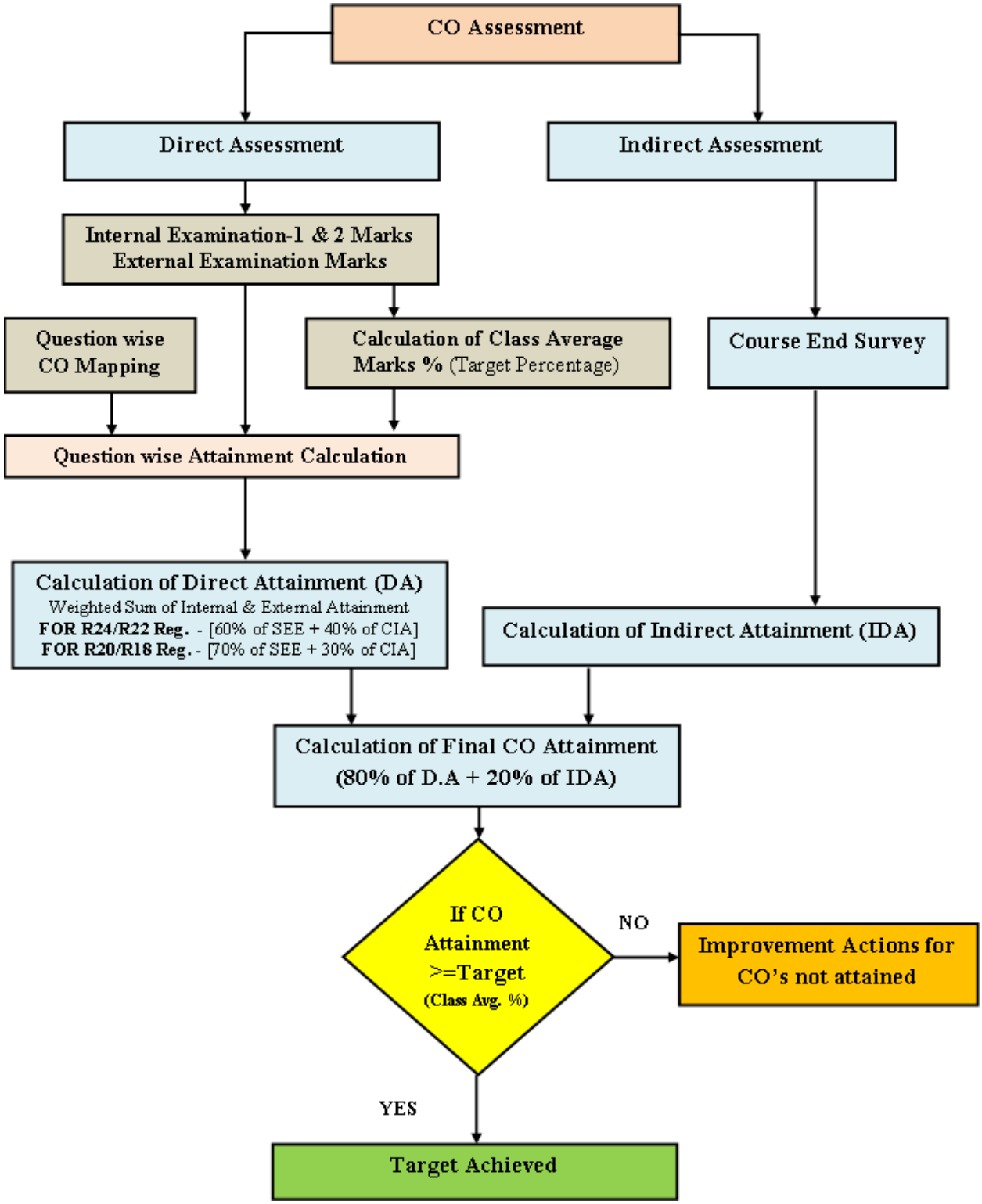

Fig 8.3: Flowchart for CO Assessment and Attainment Process

DIRECT ASSESSMENT (DA):

The attainment is calculated by evaluating:

- **Continuous Internal Assessment (CIA):** Periodic assessments such as mid-term tests and assignments.
- **Semester End Examination (SEE):** Final examination at the end of the course. The direct attainment is computed as weighted sum of Internal and semester end examination.

Course Outcome Attainment through Question-Wise Analysis

In our Outcome-Based Education (OBE) framework, a structured question-wise analysisapproach is used to determine the attainment of Course Outcomes (COs). The process is outlined below:

Target Setting:

Initially, the class average marks for the specific subject are calculated. These average marks are then converted into a percentage, which serves as the benchmark or target percentage for all questions. For each question, this target percentage is applied to its maximum marks to establish a specific target value for attainment.

For example:

If the target percentage is 70% and a question's maximum marks are 6, the target value for that question is 70%×6=4.2.

This method ensures consistency and fairness in determining attainment thresholds across all questions.

Course Outcome Mapping:

Each question is mapped to one or more specific Course Outcomes (COs). This mapping ensures that each assessment item contributes explicitly to the evaluation of defined learning outcomes.

Attainment Calculation:

The attainment level for each question is calculated by comparing the student performance against the established target value. The question-wise attainment values are then aggregated based on the CO mapping to determine the overall attainment for each Course Outcome.

Integration into Program Outcomes (POs) and Program Specific Outcomes (PSOs):

The calculated Course Outcome attainment values are further integrated into the evaluation of Program Outcomes (POs) and Program Specific Outcomes (PSOs). This step ensures alignment

between course-level assessments and program-level objectives, fostering a coherent and systematic approach to educational quality enhancement.

INDIRECT ASSESSMENT (IDA):
Feedback is collected from students through a Course End Survey, which evaluates the effectiveness of the course in meeting the outcomes.

FINAL CO ATTAINMENT CALCULATION:
The final attainment score is determined using a weighted formula:

- 80% from Direct Assessment (DA)
- 20% from Indirect Assessment (IDA)

COMPARISON WITH TARGET:
If the calculated CO attainment meets or exceeds the target, the outcomes are considered achieved. If not, improvement actions are initiated to address the deficiencies.

This framework ensures a balanced approach to measuring and improving course-level learning outcomes. In each course, the level of attainment of each CO is compared with the targets, if is not the course coordinator takes necessary steps for the improvement to reach the target. With the help of CO againstPO/PSO mapping, the PO/PSO attainment is calculated by the programme coordinator.

B. THE QUALITY/RELEVANCE OF ASSESSMENT PROCESSES & TOOLS USED

B.1 Direct Assessment Tools:

R24 REGULATION:

Sl. NO	Course Type	Assessment Tool	Description	Evaluation of course outcomes	Frequency of Assessment
1	Theory Courses	**Theory internal examinations (30M)**	Two written examinations are conducted and its average marks are considered	The questions for continuous internal assessment and end semester examination are framed in such a way that each question is mapped to the appropriate course outcome of the respective course. Attainment of Course Outcome is assessed based on student performance during the continuous internal assessment and end semester examination.	Twice in a semester
		Assignments (5M)	Two assignments are for each course for continuous assessment and average marks are considered		Twice in a semester
		Case Study/Project (5M)	Case Study/Project is for each course for continuous		Twice in a semester

			assessment and average marks are considered		
		SemesterEnd Examination (60M)	End Examination is conducted		Once per semester
2	**Laboratory Courses**	**Day to day evaluation in Laboratory (10M)**	The day to day evaluation is considered	The Internal attainment for each CO is calculated by taking average of the % attainment from Viva/Case Study/Poster Presentation The External attainment for each CO is calculated by taking attainment from Experiment Write up, Execution, Results/Output and Viva-Voce	continuous
		Internal Practical Examination (10M)	Internal examination is conducted		Once per semester
		Project(10M)	Project related to Lab demonstration is conducted		Once per semester
		Viva/Case Study/ Poster (10M)	Based on Laboratory course, the Viva/Case Study/Poster Presentation is conducted		Once per semester
		External Practical Examination (60M)	External examination is conducted		Once per semester
3	**Project Courses**	**Innovative Product Development – I, II III, IV & V (100M)** Internal = 40M External = 60M	Student has to work for implementation of their innovative idea, prepare a technical report and submit it to the department.	Three internal IPD reviews are conducted and the external examiner assessment is considered as another assessment tool for IPD and Final CO attainment is calculated.	Once per semester from II Year I Sem. to IV Year I Sem.
		Industry oriented Mini Project/Summer Internship (100M) Internal = 40M External = 60M	To test students concepts in independent analysis. Three project reviews are conducted	Three internal project reviews are conducted and Continuous assessment is carried by the project review committee first review emphasizes on literature survey and problem identification, second review on design methodology and the third review on the validation of the model and documentation. The external examiner assessment is considered as another assessment tool for Final CO attainment.	Mini Project Review in VII Semester
		Research Project I (100M) Internal = 40M External = 60M **& Research Project II(150M)** Internal = 50M External = 100M	To test students concepts in design creative thinking and independent analysis three project reviews are conducted		Research project I -VII semester & Research Project II- VIII semester
		Innovation- Start-Up & Entrepreneurship	Student has to work for implementation of their innovative idea,	Continuous assessment is carried by the review committee emphasizes on Innovative Idea and Scope, Cost	IV Year II Semester

		(100M) Mentor Marks = 30M Dept. Committee Marks = 70M	prepare a technical report and submit it to the department	Analysis, Usability, Presentation, Documentation and Viva-voce. The external examiner assessment is considered as another assessment tool for Final CO attainment.	
4	**Technical Seminar**	**Technical Seminar (100M)** Internal	To Test the students in knowledge in Recent Technical advancements and their Presentation Skills	At end of semester a student has to Present the seminar and submit the report	IV Year II Semester

Table 8.3: R24 RegulationDirect Assessment Tools

R22 REGULATION:

Sl. NO	Course Type	Assessment Tool	Description	Evaluation of course outcomes	Frequency of Assessment
1	**Theory Courses**	**Theory internal examinations (30M)**	Two written examinations are conducted and its average marks are considered	The questions for continuous internal assessment and end semester examination are framed in such a way that each question is mapped to the appropriate course outcome of the respective course. Attainment of Course Outcome is assessed based on student performance during the continuous internal assessment and end semester examination.	Twice in a semester
		Assignments (5M)	Two assignments are for each course for continuous assessment and average marks are considered		Twice in a semester
		Case Study/PPT (5M)	Case Study/PPTis for each course for continuous assessment and average marks are considered		Twice in a semester
		SemesterEnd Examination (60M)	End Examination is conducted		Once per semester
2	**Laboratory Courses**	**Day to day evaluation in Laboratory (10M)**	The day to day evaluation is considered	The Internal attainment for each CO is calculated by taking average of the % attainment from day to day evaluation, internal lab examination, Project related to lab and Viva/Case Study/Poster Presentation The External attainment for each CO is calculated by taking attainment	continuous
		Internal Practical Examination (10M)	Internal examination is conducted		Once per semester
		Project(10M)	Project related to Lab demonstration is conducted		Once per semester

		Viva/Case Study/Poster (10M)	Based on Laboratory course, the VivaCase Study/Poster Presentation is conducted	from Experiment Write up, Execution, Results/Output and Viva-Voce	Once per semester
		External Practical Examination (60M)	External examination is conducted		Once per semester
3	**Project Courses**	**Innovative Product Development – I, II III, IV & V (100M)** Internal = 40M External = 60M	Student has to work for implementation of their innovative idea, prepare a technical report and submit it to the department.	Three internal IPD reviews are conducted and the external examiner assessment is considered as another assessment tool for IPD and Final CO attainment is calculated.	Once per semester from II Year I Sem. to IV Year I Sem.
		Industry oriented Mini Project/Summer Internship (100M) Internal = 40M External = 60M	To test students concepts in independent analysis. Three project reviews are conducted	Three internal project reviews are conducted and Continuous assessment is carried by the project review committee first review emphasizes on literature survey and problem identification, second review on design methodology and the third review on the validation of the model and documentation. The external examiner assessment is considered as another assessment tool for Final CO attainment.	Mini Project Review in VII Semester
		Research Project I (100M) Internal = 40M External = 60M **Research Project II(150M)** Internal = 50M External = 100M	To test students concepts in design creative thinking and independent analysis three project reviews are conducted		Research project I -VII semester &Research Project II- VIII semester
		Innovation- Start-Up & Entrepreneurship (100M) Mentor Marks = 30M Dept. Committee Marks = 70M	Student has to work for implementation of their innovative idea, prepare a technical report and submit it to the department	Continuous assessment is carried by the review committee emphasizes on Innovative Idea and Scope, Cost Analysis, Usability, Presentation, Documentation and Viva-voce. The external examiner assessment is considered as another assessment tool for Final CO attainment.	IV Year II Semester
4	**Technical Seminar**	**Technical Seminar (100M)** Internal = 100M	To Test the students in knowledge in Recent Technical advancements and their Presentation Skills	At end of semester a student has to Present the seminar and submit the report	IV Year II Semester

Table 8.4: R22 Regulation Direct Assessment Tools

R20 REGULATION:

Sl. NO	Course Type	Assessment Tool	Description	Evaluation of course outcomes	Frequency of Assessment
1	Theory Courses	**Theory internal examinations (25M)**	Two written examinations are conducted and its average marks are considered	The questions for continuous internal assessment and end semester examination are framed in such a way that each question is mapped to the appropriate course outcome of the respective course. Attainment of Course Outcome is assessed based on student performance during the continuous internal assessment and end semester examination.	Twice in a semester
		Assignments (5M)	Two assignments are for each given course for continuous assessment average marks are considered		Twice in a semester
		SemesterEnd Examination (70M)	End Examination is conducted		Once per semester
2	Laboratory Courses	**Day to day Evaluation in Laboratory (15M)**	The day to day evaluation is considered	The final attainment for each CO is calculated by taking average of the % attainment from day to day evaluation and internal lab examination The final attainment for each CO is calculated by taking attainment from Experiment Write up, Execution, Results/Output and Viva-Voce	continuous
		Internal Practical Examination (15M)	Internal examination is conducted		Once per semester
		External Practical Examination (70M)	External examination is conducted		Once per semester
3	Project Courses	**Innovative Product Development – I, II & III (100M)** Internal = 30M External = 70M	Student has to work for implementation of their innovative idea, prepare a technical report and submit it to the department.	Three internal IPD reviews are conducted and the external examiner assessment is considered as another assessment tool for IPD and Final CO attainment is calculated.	IPD-I during III Year I semester, IPD-II during III Year II semester, IPD-III during IV Year I semester
		Industry oriented Mini Project/Summer Internship (100M) Internal = 30M External = 70M	To test students concepts in independent analysis. Three project reviews are conducted	Three internal project reviews are conducted and Continuous assessment is carried by the project review committee first review emphasizes on literature survey and problem identification, second review on design methodology and the third review on the validation of the model and documentation. The external examiner assessment is considered as another assessment tool for Final CO attainment.	Mini Project Review in VII Semester
		Project-I (100M) Internal = 30M External = 70M **Research Project(150M)** Internal = 50M	To test students concepts in design creative thinking and independent analysis three project reviews		project I -VII semester & Project II- VIII semester

		External = 1000M	are conducted		
		Innovation- Start-Up & Entrepreneurship (100M) Mentor Marks = 30M Dept. Committee Marks = 70M	Student has to work for implementation of their innovative idea, prepare a technical report and submit it to the department	Continuous assessment is carried by the review committee emphasizes on Innovative Idea and Scope, Cost Analysis, Usability, Presentation, Documentation and Viva-voce. The external examiner assessment is considered as another assessment tool for Final CO attainment.	IV Year II Semester
4	**Technical Seminar**	**Technical Seminar (100M)** Internal = 100M	To Test the students in knowledge in Recent Technical advancements and their Presentation Skills	At end of semester a student has to Present the seminar and submit the report	IV Year II Semester

Table 8.5:R20 Regulation Direct Assessment Tools

R18 REGULATION:

Sl. NO	Course Type	Assessment Tool	Description	Evaluation of course outcomes	Frequency of Assessment
1	**Theory Courses**	**Theory internal examinations (25M)**	Two written examinations are conducted and its average marks are considered	The questions for continuous internal assessment and end semester examination are framed in such a way that each question is mapped to the appropriate course outcome of the respective course. Attainment of Course Outcome is assessed based on student performance during the continuous internal assessment and end semester examination.	Twice in a semester
		Assignments (5M)	Two assignments are for each given course for continuous assessment average marks are considered		Twice in a semester
		SemesterEnd Examination (70M)	End Examination is conducted		Once per semester
2	**Laboratory Courses**	**Day to day evaluation in Laboratory (15M)**	The day to day evaluation is considered	The final attainment for each CO is calculated by taking average of the % attainment from day to day evaluation and internal lab examination The final attainment for each CO is calculated by taking attainment from Experiment Write up, Execution, Results/Output and Viva-Voce	continuous
		Internal Practical Examination (15M)	Internal examination is conducted		Once per semester
		External Practical Examination (70M)	External examination is conducted		Once per semester

3	**Project Courses**	**Industry oriented Mini Project/Summer Internship (100M)** Internal = 30M External = 70M	To test students concepts in independent analysis. Three project reviews are conducted	Three internal project reviews are conducted and Continuous assessment is carried by the project review committee first review emphasizes on literature survey and problem identification, second review on design methodology and the third review on the validation of the model and documentation. The external examiner assessment is considered as another assessment tool for Final CO attainment.	Mini Project Review in VII Semester
		Project-I (100M) Internal = 30M External = 70M **Project-II (150M)** Internal = 50M External = 100M	To test students concepts in design creative thinking and independent analysis three project reviews are conducted		project I -VII semester & Project II-VIII semester
4	**Technical Seminar**	**Technical Seminar (100M)** Internal = 100M	To Test the students in knowledge in Recent Technical advancements and their Presentation Skills	At end of semester a student has to Present the seminar and submit the report	IV Year II Semester

Table 8.6:R18 Regulation Direct Assessment Tools

1. Theory Courses:

R24 Regulation

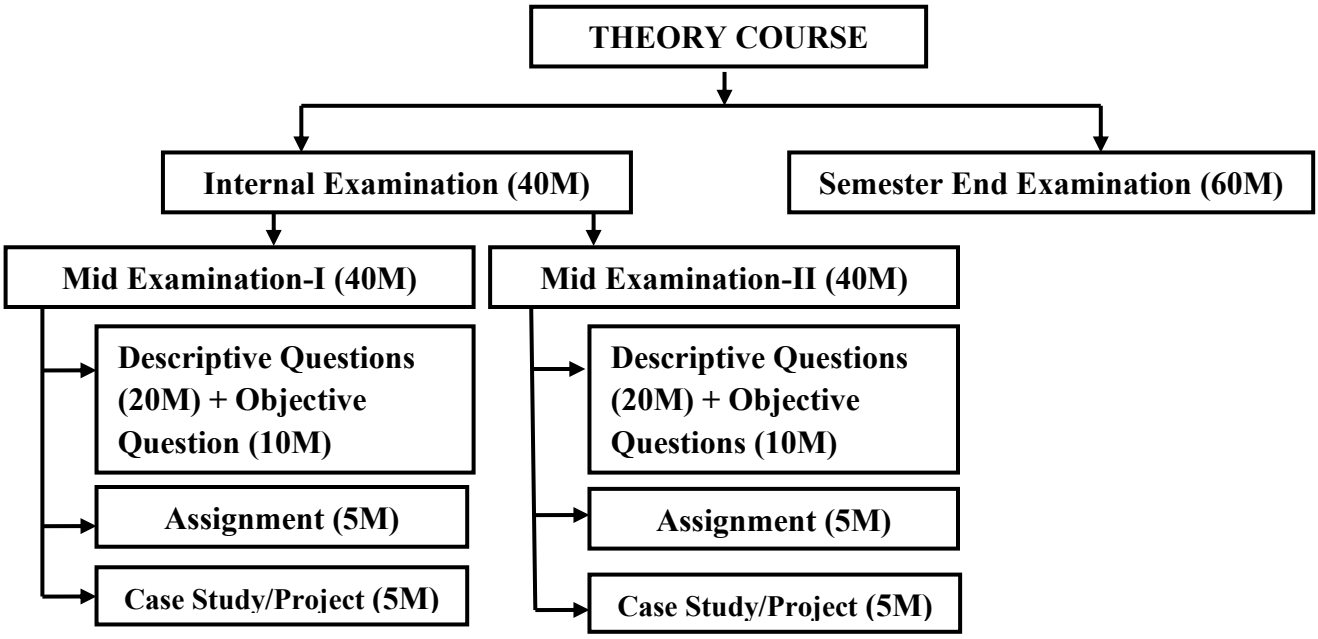

Fig 8.4:Flowchart for R24 Regulation

For theory courses, during a semester there shall be 2 mid-term examinations. Each mid- term examination consists of one descriptive paper with Objective Questions in Part-A and Descriptive Questions in Part-B. The descriptive paper shall be for 30 marks. The Descriptive part shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks. The objective part shall be for Five (10) marks contain (10) objective questions - each carriesone mark and no choice, with a total duration of 2 hours. Five (5) marks are allocated for Assignments (as specified by the subject teacher concerned) and Five(5) marks for Case Study/Project (as specified by the subject teacher concerned). The first Assignment and Case Study/Project should be submitted before the conduct of the first mid-examination and the second Assignment and Case Study/Project should be submitted before the conduct of the second mid-examination. While the first mid-term examination shall be conducted from 1 to 2 1/2 units of the syllabus, the second mid-term examination shall be conducted from 2 1/2 to 5 units. The total marks secured by the student in each midterm examination are evaluated for 40 marks and the average of the two mid-term examinations shall be taken as the final marks secured by each candidate.

The end examination will be conducted for 60 marks with Part A & B. Part-A consisting of 10 short answer questions with no choice, each question carries 1marks. Part-B consisting of two parts each (a) and (b), out of which the student has to answer (a) or (b), not both and each question carrying 10 marks

R22 Regulation

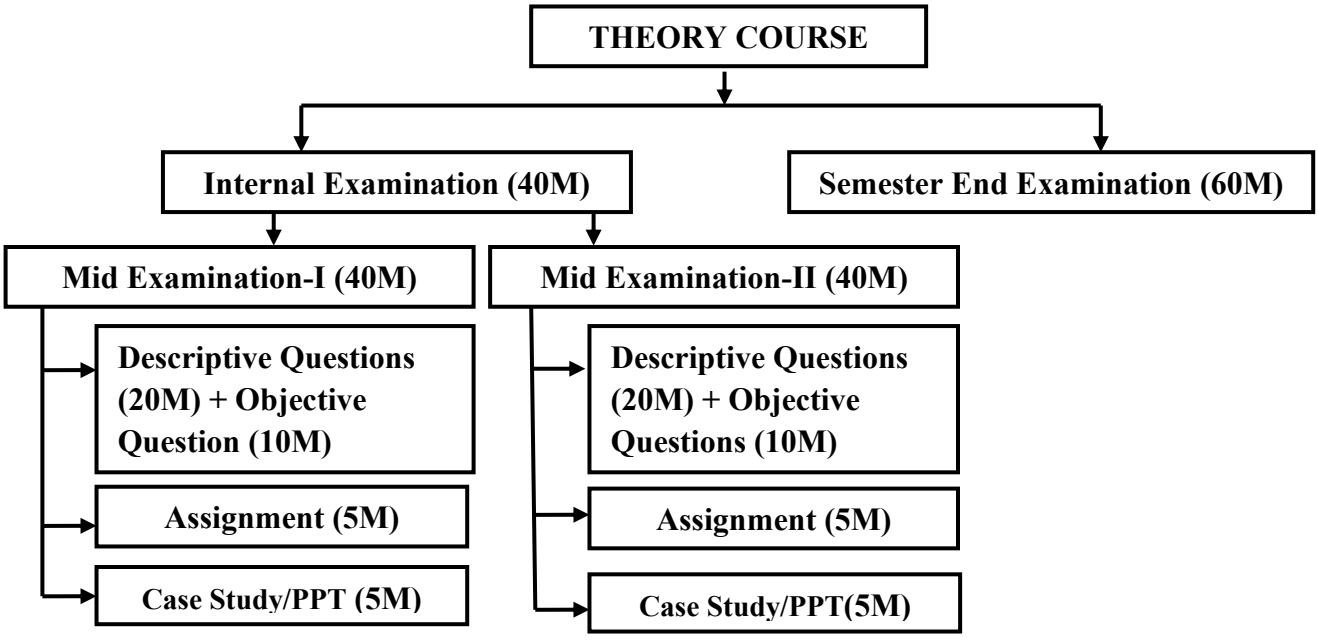

Fig 8.5:Flowchart for R22 Regulation

For theory courses, during a semester there shall be 2 mid-term examinations. Each mid- term examination consists of one descriptive paper with Objective Questions in Part-A and Descriptive Questions in Part-B. The descriptive paper shall be for 30 marks. The Descriptive part shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks. The objective part shall be for Five (10) marks contain (10) objective questions - each carriesone mark and no choice, with a total duration of 2 hours. Five (5) marks are allocated for Assignments (as specified by the subject teacher concerned) and Five(5) marks for Case Study/Project (as specified by the subject teacher concerned). The first Assignment and Case Study/PPT should be submitted before the conduct of the first mid-examination and the second Assignment and Case Study/PPT should be submitted before the conduct of the second mid-examination. While the first mid-term examination shall be conducted from 1 to 2 1/2 units of the syllabus, the second mid-term examination shall be conducted from 2 1/2 to 5 units. The total marks secured by the student in each midterm examination are evaluated for 40 marks and the average of the two mid-term examinations shall be taken as the final marks secured by each candidate.

The end examination will be conducted for 60 marks with Part A & B. Part-A consisting of 10 short answer questions with no choice, each question carries 1marks. Part-B consisting of two parts each (a) and (b), out of which the student has to answer (a) or (b), not both and each question carrying 10 marks

R20/R18 Regulation

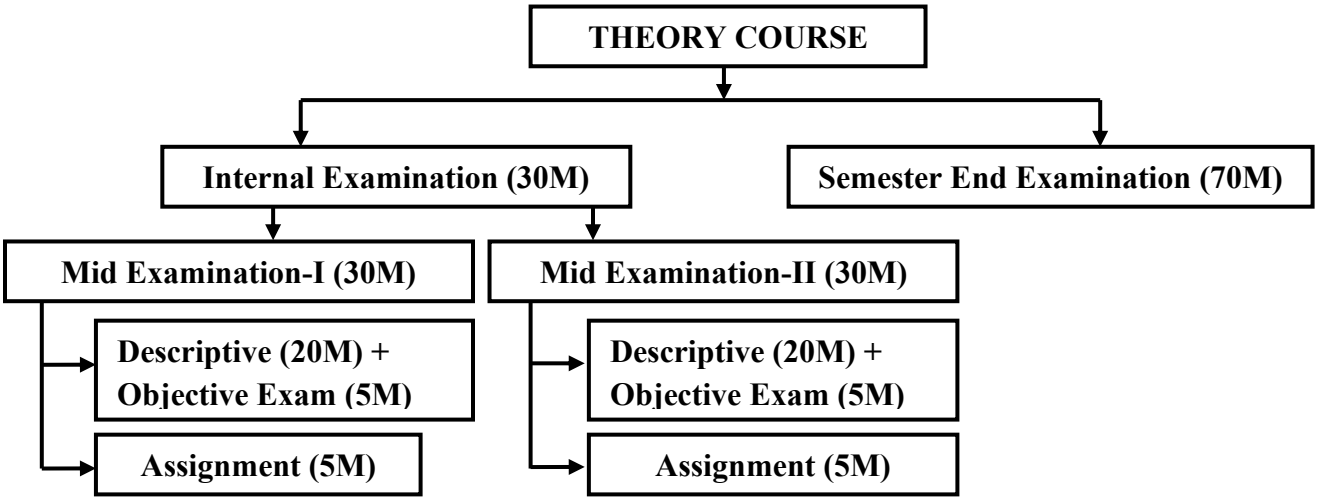

Fig 8.6:Flowchart for R18/R20 Regulation

For theory courses, during a semester there shall be 2 mid-term examinations. Each mid- term examination consists of one descriptive paper, one objective paper and assignment. The

descriptive paper shall be for 20 marks. The descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks. The objective paper shall be for Five (5) marks contain (10) objective questions - each carries half mark and no choice, with a total duration of 2 hours. Five (5) marks are allocated for Assignments (as specified by the subject teacher concerned). The first Assignment should be submitted before the conduct of the first mid-examination and the second Assignment should be submitted before the conduct of the second mid-examination. While the first mid-term examination shall be conducted from 1 to 2 1/2 units of the syllabus, the second mid-term examination shall be conducted from 2 1/2 to 5 units. The total marks secured by the student in each midterm examination are evaluated for 30 marks and the average of the two mid-term examinations shall be taken as the final marks secured by each candidate.

The end examination will be conducted for 70 marks with Part A & B. Part-A consisting of 8 short answer questions out of which 5 question need to be answered, each question carries 2 marks. Part-B consisting of two parts each (a) and (b), out of which the student has to answer (a) or (b), not both and each question carrying 12 marks

2. Laboratory Courses:

R24/R22 Regulation

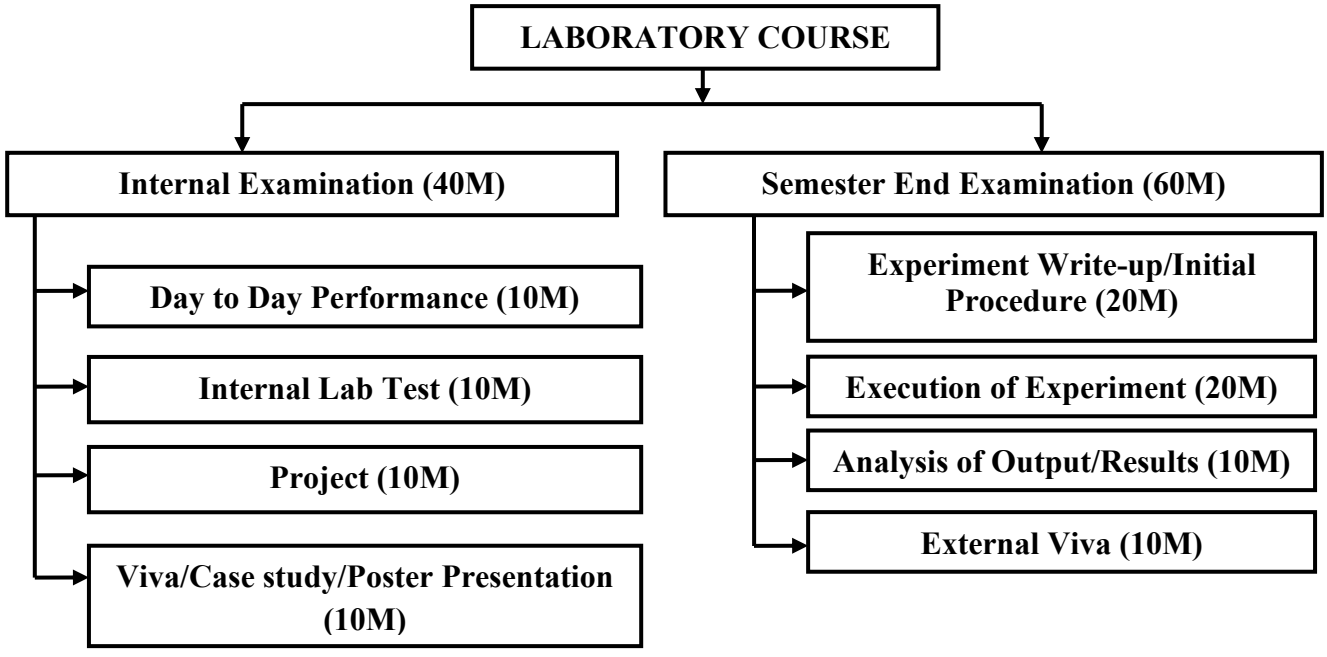

Fig 8.6:Flowchart for R24/R22 Regulation Laboratory Courses

For Laboratory courses, there shall be a continuous evaluation during a semester for 40 internal marks and 60 end semester examination marks. Out of the 40 marks for internal evaluation, day-to-day work(10M), Internal Lab Test(10M), Project(10M) and Viva/Case study/Poster

Presentation(10M) conducted by the laboratory teacher concerned. The end semester examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the clusters of colleges which are decided by the Principal of the College

R20/R18 Regulation

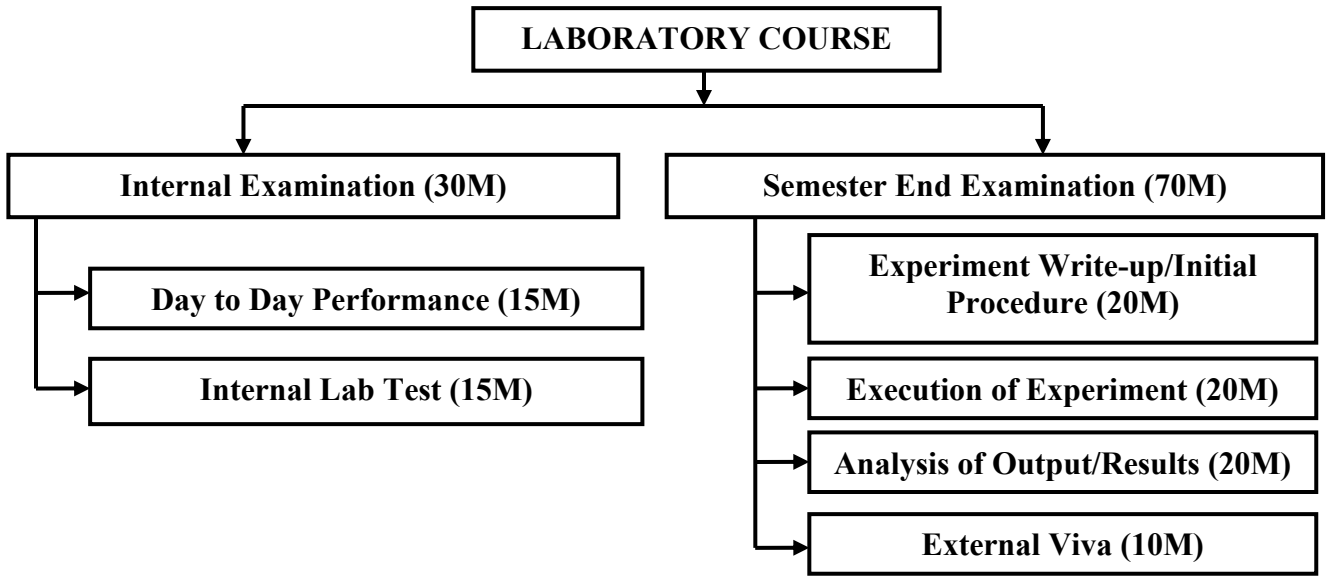

Fig 8.7:Flowchart for R20/R18 Regulation Laboratory Courses

For Laboratory courses, there shall be a continuous evaluation during a semester for 30 internal marks and 70 end semester examination marks. Out of the 30 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 15 marks conducted by the laboratory teacher concerned. The end semester examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the clusters of colleges which are decided by the Principal of the College

3. Project Courses:

The department has introduced Project-Based Learning (PBL) starting from the second year, incorporating Innovative Product Development (IPD) course and Research-Based Projects starting in the seventh semester. To gain greater practical experience, students are required to complete two research projects: one in the first semester of their fourth year (IV B.Tech – I Sem) and another in the second semester of their fourth year (IV B.Tech – II Sem). Research Project- I shall be evaluated for 100 marks and Research Project - II shall be evaluated for 150 marks. This approach helps students gain hands-on experience and enhances their technical and problem-solving skills through research mindset. As project enables the department to assess the

knowledge and competency of the students, the student's projects are selected in line with department vision, mission and program outcomes. Before starting the project work students are provided with brief idea of various emerging fields for selecting the project ideas. We encourage the students to take up the projects on most innovative technologies which have a demand in present day market. The department emphasizes the students, the importance of excelling in project work, where student apply the theoretical knowledge gained during undergraduate program and develop an engineering project as a team. This not only provides good insight into the knowledge gained but also develops soft skills of the students and prepares them well for job in the industry or higher studies.

Initiatives taken by department for improving the quality of students Projects

- Conducting workshops on core subjects like Embedded Systems, VLSI, IoT, Computer Vision, Robotics, Communications, Artificial Intelligence, and Machine Learning from the second year onward, enabling students to apply these concepts in their project development.
- Promoting in-house projects by encouraging students to use campus facilities and work under faculty guidance.
- Supporting students in publishing their completed project work in national and international journals and conferences.

Project Review Committee:

To monitor continuously the progress of individual project work students, Head of the Department forms the Project Review Committee (PRC) before the commencement of semester. The main objective of PRC is to monitor, guide and review the progress of student projects. The committee members are as follows

1. Head of The Department
2. Coordinators - 2 Senior Faculty members
3. Project Internal Guide

The following systematic approach is adapted to improve the quality of the projects

A) Identification of Projects and Allocation of Guides

The project coordinator addresses the importance of project course work and the evaluation guidelines to students at the beginning of the seventh semester. She/He will be given guidance about the various domains, technology, type of project (application, product, research etc.) to be

carried out as project course work to attain the Program Outcomes (POs). The below figure shows the complete process of identification of project and allocation of internal guides

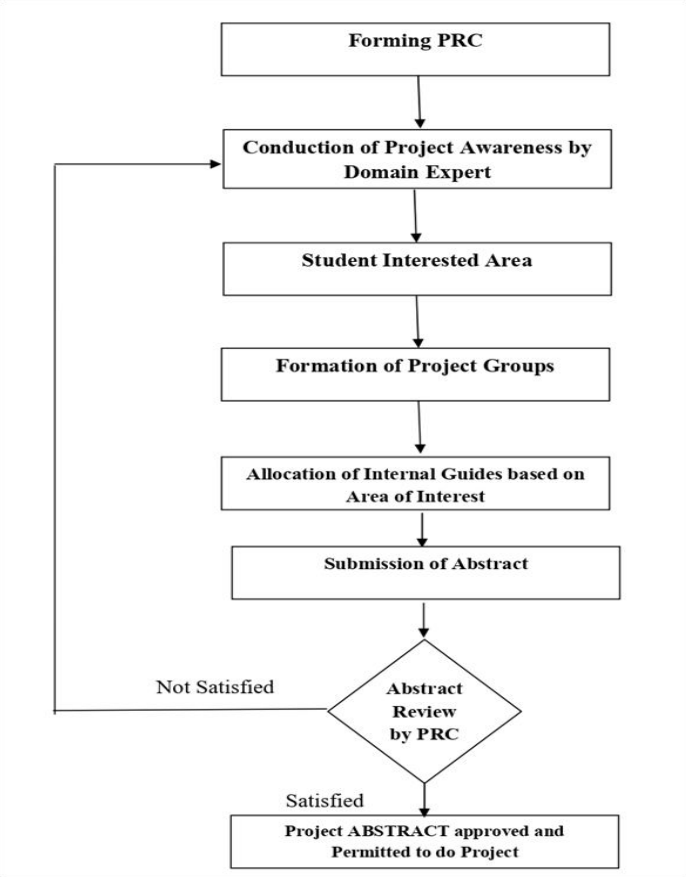

Fig 8.8. Process for identification of Project and allocation of Project Guides

B. Project Proposal by Students:

Students are encouraged to refer the various peer review journals for selection of project proposal. In this regard to help the students the college library provides free access to various peer review journals and e-resources through K-Nimbus platform. Each student is facilitated to free access to IEEE / Scopus journals both on and off campus. Students are required to discuss their project proposals with their assigned internal guide and prepare an abstract, which is then submitted to the Project Review Committee (PRC) for approval. The PRC reviews each proposal and provides feedback. Based on the PRC's comments, students may need to revise and resubmit their proposals. If the PRC finds the proposal unsatisfactory, the student must review the project area with their internal guide and submit a new proposal for PRC approval. Once approved, the proposal is signed by the internal guide and submitted to the Project Coordinator. The Project Coordinator then compiles a PRC-ratified list of approved projects, including student and

internal guide details, which is displayed on the departmental notice board. During the approval process, the PRC evaluates projects based on:

- **Project feasibility** (time, supervision, cost implications, equipment availability, access to necessary literature, and data availability)
- **Academic challenge**

C. Process of Monitoring and Evaluation

C.1. Process of Monitoring

Once the project title is confirmed and an internal guide is appointed, students are officially approved to commence their project work. The internal guide plays a crucial role in overseeing the project's development, ensuring that students are consistently aligned with their objectives and maintaining steady progress.

As part of this process, students are required to submit weekly progress reports detailing their activities, challenges faced, solutions attempted, and any key insights gained. These reports provide a structured account of the project's advancement, allowing the guide to track each phase of the work comprehensively. By reviewing these reports, the guide evaluates both the technical quality of the work and the students understanding of the project.

The guide provides constructive feedback on each report, addressing any gaps or potential issues, and offering recommendations to keep the project on course. The following corrective measures are suggested by internal guide for underperforming students in project work. These measures are expected to incorporate and make necessary revisions, and refine their project as they proceed to the next phase.

- **Identify Root Causes:** Assess skill gaps, team dynamics, interest levels, or personal challenges affecting performance.
- **Provide Focused Support:** Offer mentoring, technical workshops, and resources to address specific difficulties.
- **Set Clear Milestones:** Break the project into smaller tasks with deadlines and monitor progress regularly.
- **Enhance Team Collaboration:** Reassign roles based on strengths, resolve conflicts, and ensure balanced contributions.
- **Incorporate Continuous Feedback:** Conduct regular reviews and provide constructive, actionable guidance.
- **Motivate and Recognize Efforts:** Celebrate small achievements and highlight the projects relevance to career growth.

- **Offer Remedial Support:** Assign simpler tasks or mini-projects to build confidence and foundational skills.

In addition, the guide holds regular discussions with the students, offering technical insights, resources, and solutions to any specific challenges that may arise. This ongoing support not only ensures that the project adheres to its planned objectives and timelines but also helps students build problem-solving skills and technical knowledge through hands-on guidance. The collaborative process reinforces a strong foundation, enabling students to achieve a high-quality outcome that reflects both practical experience and academic rigor. The following figure shows the process of project monitoring. The entire process of Project monitoring is summarized in the figure below.

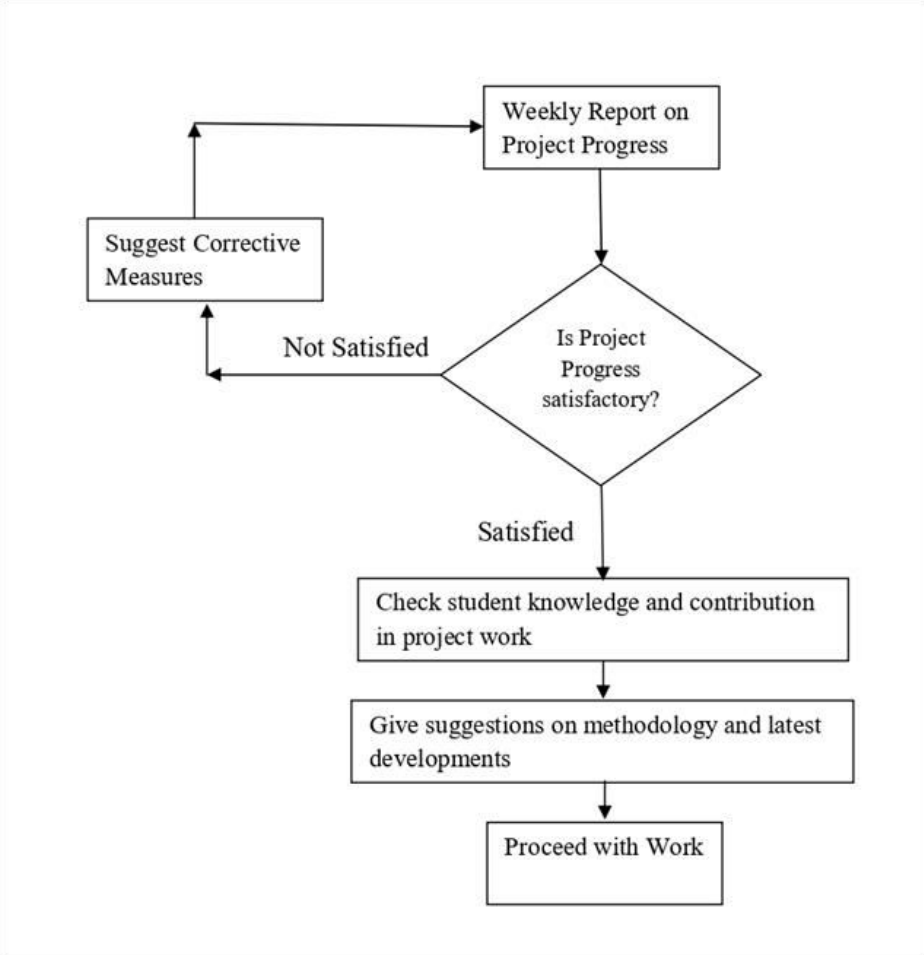

Fig8.9: Process of monitoring the project work

C.1. Process of Project Evaluation

Research Project - I is evaluated for a total of 100 marks, while Research Project - II is evaluated for 150 marks. For Research Project - I, the 100 marks are distributed as follows: 30 marks for Continuous Internal Evaluation (CIE) and 70 marks for the End Semester Viva-Voce Examination (SEE). Similarly, for Research Project - II, the 150 marks are allocated with 50 marks for CIE and 100 marks for the SEE.

The Continuous Internal Evaluation process for student projects is structured around a series of department reviews conducted by members of the Project Review Committee (PRC). To ensure a transparent and objective evaluation, students are given detailed evaluation guidelines at the start of each review. These guidelines outline specific criteria for assessment, helping students understand expectations and prepare thoroughly.

The PRC conducts three formal review sessions as per the following schedule. Each review is allotted 30 marks for Research Project - I and 50 marks for Research Project - II. The total marks secured by the student in each review are evaluated based on the respective marks for Research Project - I (30 marks) and Research Project - II (50 marks). The final internal marks for each candidate are determined by calculating the average of the three review scores.

Schedule of project reviews

S.No	Review	Time
1	**Guide Allotment and Finalization of Title and Abstract** Title finalization and Abstract submission, Guide allocation	1st week after commencement of semester
2	**Review – I** Presentation on problem identification, literature survey, partial implementation	2nd week after commencement of semester
3	**Review – II** Progress of Project work, Challenges during implementation	7th week after commencement of semester
4	**Review – III** Complete Project Demonstration with complete module along with Project Documentation	13th week after commencement of semester

Table 8.7: Schedule of Project Reviews

During these reviews, the PRC closely examines the project's alignment with the proposed objectives, ensuring that it progresses in the right direction. Committee members also evaluate

each student's depth of understanding of the project, their problem-solving abilities, and their individual contributions. This helps assess both the technical knowledge and teamwork skills essential for project success.

The PRC provides constructive feedback to guide students, highlighting any deficiencies, technical adjustments, or areas for improvement. This iterative feedback process not only improves the quality of the project but also fosters critical thinking, adaptability, and a hands-on approach to problem-solving.After successfully completing the three mandatory review sessions, students proceed to the final stage of the project assessment, which involves the preparation and submission of a comprehensive project report. This report serves as a detailed documentation of the entire project, including the background research, objectives, methodology, technical implementation, results, analysis, and conclusions drawn from the work. It is essential that the report reflects both the technical rigor and depth of understanding gained through the project.

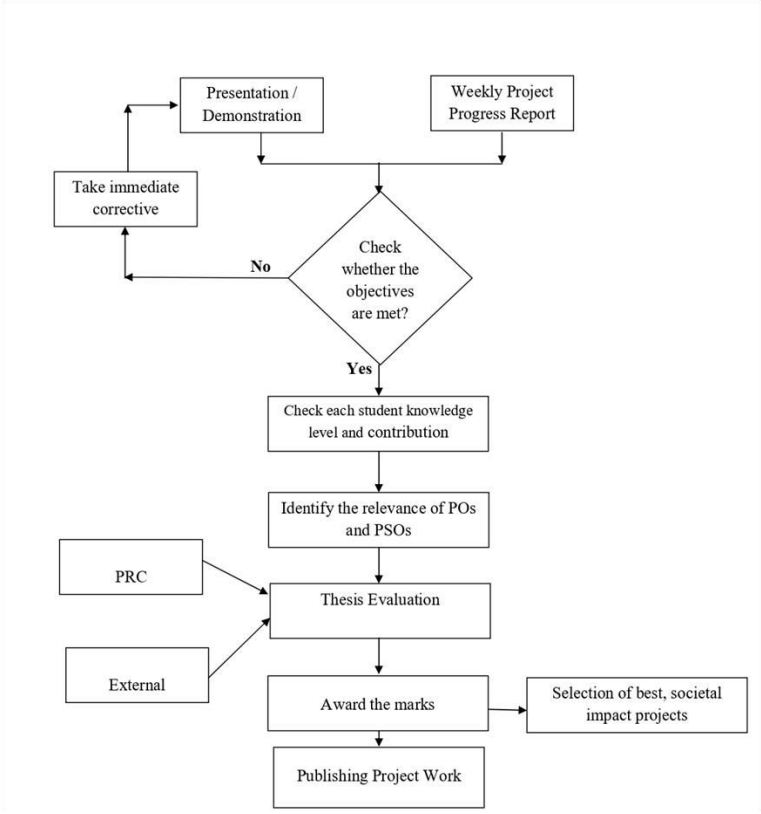

Fig 8.9(b): Process of Project Evaluation

Once project report preparation is completed, the report is submitted to an examiner committee for evaluation during the Project Viva Voce. During the Viva, students deliver an in-depth presentation of their project work using a PowerPoint presentation. This presentation covers all aspects of the project—from initial planning and design to the challenges faced, solutions

implemented, and final outcomes. Students are expected to provide a thorough explanation of their project findings and justify their approach and decisions, demonstrating both technical and practical understanding.

The examiner committee evaluates the project based on several criteria, including the technical quality of the work, the student's depth of knowledge, problem-solving abilities, and the overall coherence and execution of the project. The committee also assesses the student's ability to clearly communicate and defend their work during the Viva. Based on this comprehensive evaluation, the committee assigns the final marks for the project, reflecting the student's performance, effort, and achievements in completing the project successfully.

Assessment Tool – R24/R22 Regulation		**Evaluator**
Continuous Internal Evaluation (CIE) Research Project –I : 40 marks Research Project -II: 50 marks	Review I : 40 Marks (Research Project –I) 50 Marks (Research Project-II) Review II : 40 Marks (Research Project –I) 50 Marks (Research Project-II) Review III : 40 Marks (Research Project –I) 50 Marks (Research Project-II) **Final Marks** : Average of (Review1, Review2, Review3)	Project Review Committee
Semester End Examination (SEE) Research Project –I: 60 marks Research Project-II : 100 marks	Power Point Presentation / working model demonstration and Viva Voce 60 marks (Research Project –I) 100 Marks (Research Project –II)	Project Review Committee and External Examiner

Table 8.8(a): Project Assessment Tool-R24/R22 Regulation

Assessment Tool- R20 Regulation		**Evaluator**
Continuous Internal Evaluation (CIE) Project –I : 30 marks Research Project : 50 marks	Review I : 30 Marks (Project-I) 50 Marks (Research Project) Review II : 30 Marks (Project-I) 50 Marks (Research Project) Review III : 30 Marks (Project-I) 50 Marks (Research Project)	Project Review Committee

	Final Marks : Average of (Review1, Review2, Review3)	
Semester End Examination (SEE) Project –I : 70 marks Research Project : 100 marks	Power Point Presentation / working model demonstration and Viva Voce 70 marks (Project-I) 100 Marks (Research Project)	Project Review Committee and External Examiner

Table 8.8(b): Project Assessment Tool-R20 Regulation

Assessment Tool- R18 Regulation		**Evaluator**
Continuous Internal Evaluation (CIE) Project –I : 30 marks Project –II: 50 marks	Review I : 30 Marks (Project-I) 50 Marks (Project-II) Review II : 30 Marks (Project-I) 50 Marks (Project-II) Review III : 30 Marks (Project-I) 50 Marks (Project-II) **Final Marks** : Average of (Review1, Review2, Review3)	Project Review Committee
Semester End Examination (SEE) Project –I : 70 marks Project-II: 100 marks	Power Point Presentation / working model demonstration and Viva Voce 70 marks (Project-I) 100 Marks (Project-II)	Project Review Committee and External Examiner

Table 8.9: Project Assessment Tool-R18 Regulation

MODEL EVALUATION SHEETS DURING REVIEWS

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
(Autonomous Institution-UGC, Govt. of India)
Accredited by NAAC with 'A+' Grade | Programmes Accredited by NBA
National Ranking by NIRF Innovation – Rank band(151-300), MHRD, Govt. of India
Approved by AICTE, Affiliated to JNTUH, ISO 9001:2015 Certified Institution
Maisammaguda, Dhulapally, Secunderabad 500100.

DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING
PROJECT EVALUATION FORM
ProjectWork

ECE-IVB.Tech-II Semester **Review No: I**

ProjectTitle:

Hall Ticket No	Problem Statement and Literature Survey (15M)	Proposed Solution (15M)
	CO1	CO2

CO1: Independently carry out literature survey in identified domain, and consolidate it to formulate a problem statement

CO2: Apply identified knowledge to solve a complex engineering problem and design a solution, implement and test the proposed solution

Internal Guide **Faculty -1** **Faculty -2** **H.O.D**

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN

(Autonomous Institution-UGC, Govt. of India)

Accredited by NAAC with 'A+' Grade | Programmes Accredited by NBA

National Ranking by NIRF Innovation – Rank band(151-300), MHRD, Govt. of India

Approved by AICTE, Affiliated to JNTUH, ISO 9001:2015 Certified Institution

Maisammaguda, Dhulapally, Secunderabad 500100.

DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING
PROJECT EVALUATION FORM

Project Work

ECE-IVB.Tech-II Semester **Review No: II**

ProjectTitle:

Hall Ticket No	Implementation of Project (15M)	Social Impact of Project (15M)
	CO3	CO4
CO3: Use synthesis/modeling to simulate and solve a problem or apply appropriate method of analysis to draw valid conclusions and present, demonstrate, execute final version of project		
CO4: Incorporate the social, environmental and ethical issues effectively into solution of an engineering problem		

Internal Guide **Faculty -1** **Faculty -2** **H.O.D**

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
(Autonomous Institution-UGC, Govt. of India)
Accredited by NAAC with 'A+' Grade | Programmes Accredited by NBA
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DEPARTMENT OF ELECTRONICS & COMMUNICATIONS ENGINEERING
PROJECT EVALUATIONFORM

Project Work

ECE-IVB.Tech-II Semester **Review No: III**

ProjectTitle:

Hall Ticket No	Individual Contribution in Project Work (15M)	Project Documentation and Presentation (15M)
	CO5	CO6
CO5: Contribute effectively as a team member or leader to manage the project timeline		
CO6: Write pertinent project reports and make effective Project Presentations		

Table 1:Project work

Internal Guide **Faculty -1** **Faculty -2** **H.O.D**

C.Types and relevance of the projects and their contribution toward attainment of POs and PSOs

Projects are carefully selected to align with the Program Outcomes (POs) and Program Specific Outcomes (PSOs), ensuring that they provide students with the necessary skills and knowledge to succeed in both industry and academic research fields. By integrating real-world challenges with theoretical learning, these projects act as a pivotal foundation for students future careers.

Through these projects, students are encouraged to apply the academic concepts and principles they have learned throughout their coursework to identify and tackle problems in various domains of Electronics and Communication. This practical experience is crucial for bridging the gap between theory and practice, allowing students to develop solutions that are both technically sound and aligned with the needs of the industry.By working on these projects, students gain invaluable insights into the complexities of real-world challenges, preparing them to enter the workforce or pursue higher studies with confidence. The projects also cultivate teamwork, communication, and project management skills, which are essential for success in both industry and academic research. Ultimately, these projects serve as a stepping stone, equipping students with the skills and experience needed to excel in their chosen career paths.

The following are the outcomes of Project Work

CO1:	Independently carry out literature survey in identified domain, and consolidate it to formulate a problem statement
CO2:	Apply identified knowledge to solve a complex engineering problem and design a solution, implement and test the proposed solution
CO3:	Use synthesis/modeling to simulate and solve a problem or apply appropriate method of analysis to draw valid conclusions and present, demonstrate, execute final version of project
CO4:	Incorporate the social, environmental and ethical issues effectively into solution of an engineering problem
CO5:	Contribute effectively as a team member or leader to manage the project timeline
CO6:	Write pertinent project reports and make effective Project Presentations

Table 2:Outcomes of Project Work

The following Table shows the relevance of the projects and the attainment of POs and PSOs.

CO-PO-PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3										3	3	3	
CO2	3		3										3	3	
CO3				3	3								3	3	
CO4						3	3	3							3
CO5									3		3				3
CO6										3		3			3
Avg.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Table3: CO-PO-PSO Mapping of Project Work

Innovative Product Development:

R22 Regulations:

Innovative Product Development shall be carried out in Three (5) stages: Innovative Product Development-I during II Year I semester, Innovative Product Development-II during II Year II semester, Innovative Product Development-III during III Year I, Innovative Product Development-IV during III Year II semester and Innovative Product Development-V during IV Year ISemester. Each stage will be evaluated for 100 marks. Student has to work for implementation of their innovative idea, prepare a technical report and submit it to the department. Out of a total of 100 marks for the Innovative Product Development in each stage,40 marks shall be for internal and 60 marks shall be for external end semester examination (Viva – Voce). The Internal marks evaluation shall be evaluated by the departmental committee consisting of Head of the Department, mentor and a senior faculty member. External marks shall be evaluated by the committee consisting of an external examiner from Industry; Head of the Department and mentor based on the work carried out in Innovative Product Development.

Assessment Tool		Evaluator
Continuous Internal Evaluation (CIE) 40 Marks	Review - I Review - II Review - III **Final Marks** :Average of (Review1, Review2, Review3)	IPD Review Committee
Semester End Examination (SEE) 60 Marks	Power Point Presentation / working model demonstration and Viva Voce	IPD Review Committee and External Examiner

Table 4: Innovative Product Development Assessment Tool

R20 Regulations:

Innovative Product Development shall be carried out in Three (3) stages: Innovative Product Development-I during III Year I semester, Innovative Product Development-II during III Year II semester, Innovative Product Development-III during IV Year I semester. Each stage will be evaluated for 100 marks. Student has to work for implementation of their innovative idea, prepare a technical report and submit it to the department. Out of a total of 100 marks for the Innovative Product Development in each stage,30 marks shall be for internal and 70 marks shall be for external end semester examination (Viva – Voce). The Internal marks evaluation shall be evaluated by the departmental committee consisting of Head of the Department, mentor and a senior faculty member. External marks shall be evaluated by the committee consisting of an

external examiner from Industry; Head of the Department and mentor based on the work carried out in Innovative Product Development.

Assessment Tool		Evaluator
Continuous Internal Evaluation (CIE) 30 Marks	Review - I Review - II Review - III **Final Marks** :Average of (Review1, Review2, Review3)	IPD Review Committee
Semester End Examination (SEE) 70 Marks	Power Point Presentation / working model demonstration and Viva Voce	IPD Review Committee and External Examiner

Table 5: Innovative Product Development Assessment Tool

Innovation- Start-Up & Entrepreneurship:

Innovation Startup & Entrepreneurship work shall be carried out in IV Year II Semester. Each Student shall start the Innovation Startup & Entrepreneurship Work as per the instructions of the mentor assigned by the Head of Department. Student has to work for implementation of their innovative idea, prepare a technical report and submit it to the department. The technical report shall be evaluated for 100 internal marks. It shall be evaluated for 30 marks by mentor and the other 70 marks shall be awarded by a Departmental Committee consisting of Head of the Department, Senior faculty member and mentor based on the work carried out. A student shall acquire 3 credits assigned to the Innovation Startup & Entrepreneurship, when she secures 40% or more marks for the total of 100 marks. Semester End Examination for The Innovation Startup & Entrepreneurship shall be completed before the commencement of Semester End Theory examinations. There shall be no external evaluation for Innovation Startup & Entrepreneurship.

Mentor Valuation (30 Marks)	Innovative Idea and Scope (5M)	Cost Analysis (5M)	Usability (5M)	Presentation (5M)	Documentation (5M)	Viva-voce (5M)
Dept. Committee Valuation (70 Marks)	Innovative Idea and Scope (10M)	Usability (10M)	Presentation (25M)	Documentation (15M)	Viva-voce (10M)	Total (70M)

Table 6: Innovation- Start-Up & Entrepreneurship Assessment Process

Technical Seminar:

There shall be a Technical Seminar presentation in IV year II semester. For the seminar, the student shall collect the information on a specialized topic, prepare a technical report, and submit

it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 100 internal marks. There shall be no external evaluation for the Technical Seminar.

B.2 Indirect Assessment Tools:

Mode of Assessment	Assessment Tool	Description	Evaluation of course outcomes	Frequency of Assessment
Indirect	**Course End Survey**	This survey gives the opinion of the student on the attainment of course outcomes	At the end of the Course, Course End Survey is collected from Individual Student and considered for the CO attainment under indirect assessment	At the end of the Course

Table 7: Indirect Assessment Tools

SAMPLE COURSE END SURVEY FORM

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COURSE END SURVEY

BATCH:2020-24

Name(in Full):
Roll No:
Branch:
Year/Sem:II/I

Course Name: Signals & Systems

Rate the following Course Outcomes fulfillment as per given criteria

3-Extreemly Achieved 2-Moderately Achieved 1-Slightly Achieved

Course Outcomes:

	CO Statement	Rating
CO1	Classify various signal types (e.g., continuous, discrete) and perform fundamental operations to interpret and manipulate signal characteristics.	
CO2	Analyze signals using orthogonal functions and vector spaces, and demonstrate Fourier series and transform applications for both periodic and non-periodic signals.	
CO3	Apply the Fourier Transform to transition between time and frequency domains, Evaluate signal properties such as bandwidth, sampling, aliasing, and reconstruction.	
CO4	Examine signal behavior through linear time-invariant (LTI) systems, assessing conditions for distortion less transmission and understanding filter characteristics.	
CO5	Utilize the Laplace Transform for complex signal analysis and relate it to the Fourier Transform in solving real-world signal processing problems.	
CO6	Interpret discrete-time systems through Z-transforms, compare it with other transforms, and apply it to practical discrete-time signal problems.	

SIGN

The following criteria are considered in Question wise Attainment:
Step 1: The Target level for the attainment of COs is based on the class average value of that course in CIA/SEE examinations.
Step 2: Identify the number of students obtained marks more than the target value, N1.
Step 3: Identified the number of attempted students (N2) the questions in CIA/SEE examinations for a particular CO
Step 4: Calculate the percentage of the students, (N1/N2) *100
Step 5: The level of attainment is based on the percentage as illustrated in Table

Level	Percentage of students achieved threshold value
3(High)	>=70%
2(Moderate)	>=50% and <70%
1(Low)	>0% and <50%

Indirect Attainment of COs:
In this method, the students are asked to submit the course end surveys at the completion of course.The questionnaires are marked on a scale of 3. In this survey, the threshold values are fixed based on the student's average feedback.

The components of COs attainment are set as given in the table

Level	Percentage of students reached expected level of answering the Survey
3(High)	>=70%
2(Moderate)	>=50% and <70%
1(Low)	>0% and <50%

Calculation for the attainments of CO and PO/PSO:
The student performance in Continuous Internal Examination is verified in each question.

$$CO\ Attainment(Direct) = \frac{No.of\ Students\ reached\ (threshold) in\ answering\ the\ question}{No.of\ students\ attempted} * 100$$

$$CO\ Attainment(Indirect) = \frac{Sum\ of\ \ Students\ responses\ reached\ expected\ level\ in\ answering\ the\ survey}{No.of\ students\ responded} * 100$$

Weightage of attainment level calculation is 80% of direct level and 20% of indirect level of that CO.

Therefore,**Overall CO Attainment = 0.8 * CO attainment (Direct) + 0.2 * CO attainment (indirect)**

Based on the CO attainments, action plan will be prepared for addressing the compliances in non-attainment of CO's.

10. ATTAINMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

A. PO/PSO - ASSESSMENT TOOLS AND PROCESSES:

The institute has the following methods for assessing attainment of POs/PSOs.

1. Direct method

2. Indirect method

The attainment levels of course outcomes help in computing the PO/PSO based upon the mapping done.

The CO values of both theory and laboratory courses with appropriate Weightage as per CO-PO mapping, as per Program Articulation Matrix are considered for calculation of direct attainment of PO/PSOs.

PO Direct Attainment = (Strength of CO-PO)*CO attainment / Sum of CO-PO strength. The below rubrics represents the evaluation process of POs/PSOs attainment through course outcome attainment

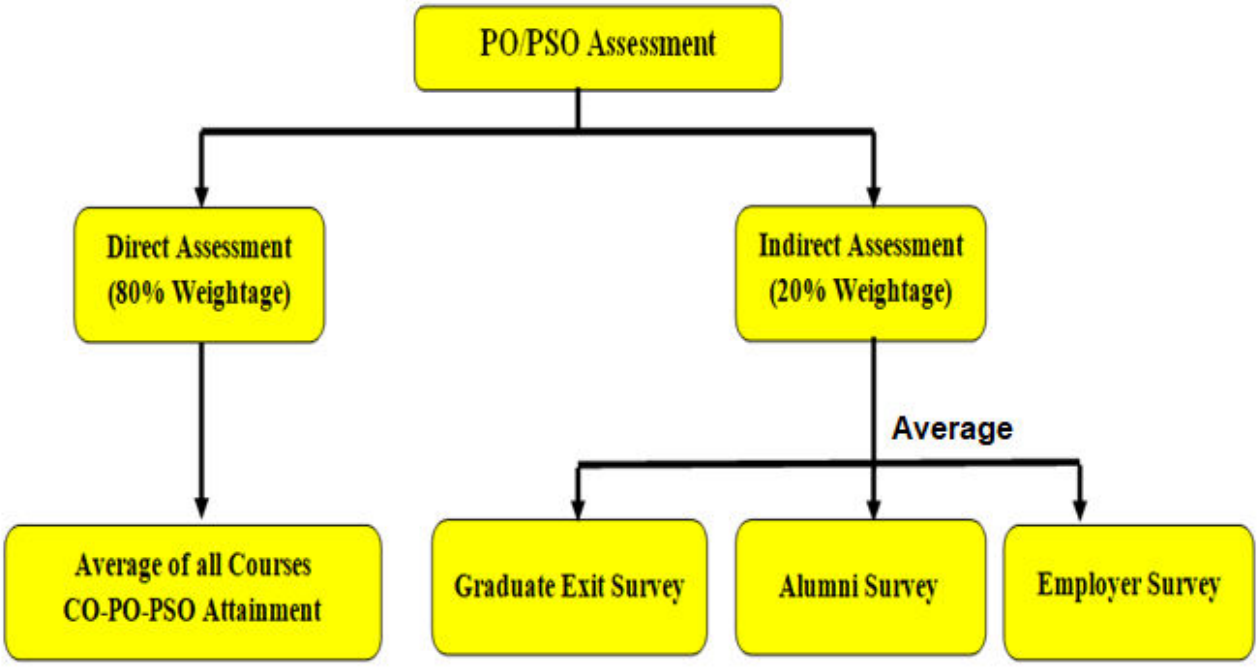

Fig 10.1 :PO/PSO - ASSESSMENT TOOLS AND PROCESSES

PO/PSO's Assessment Process:

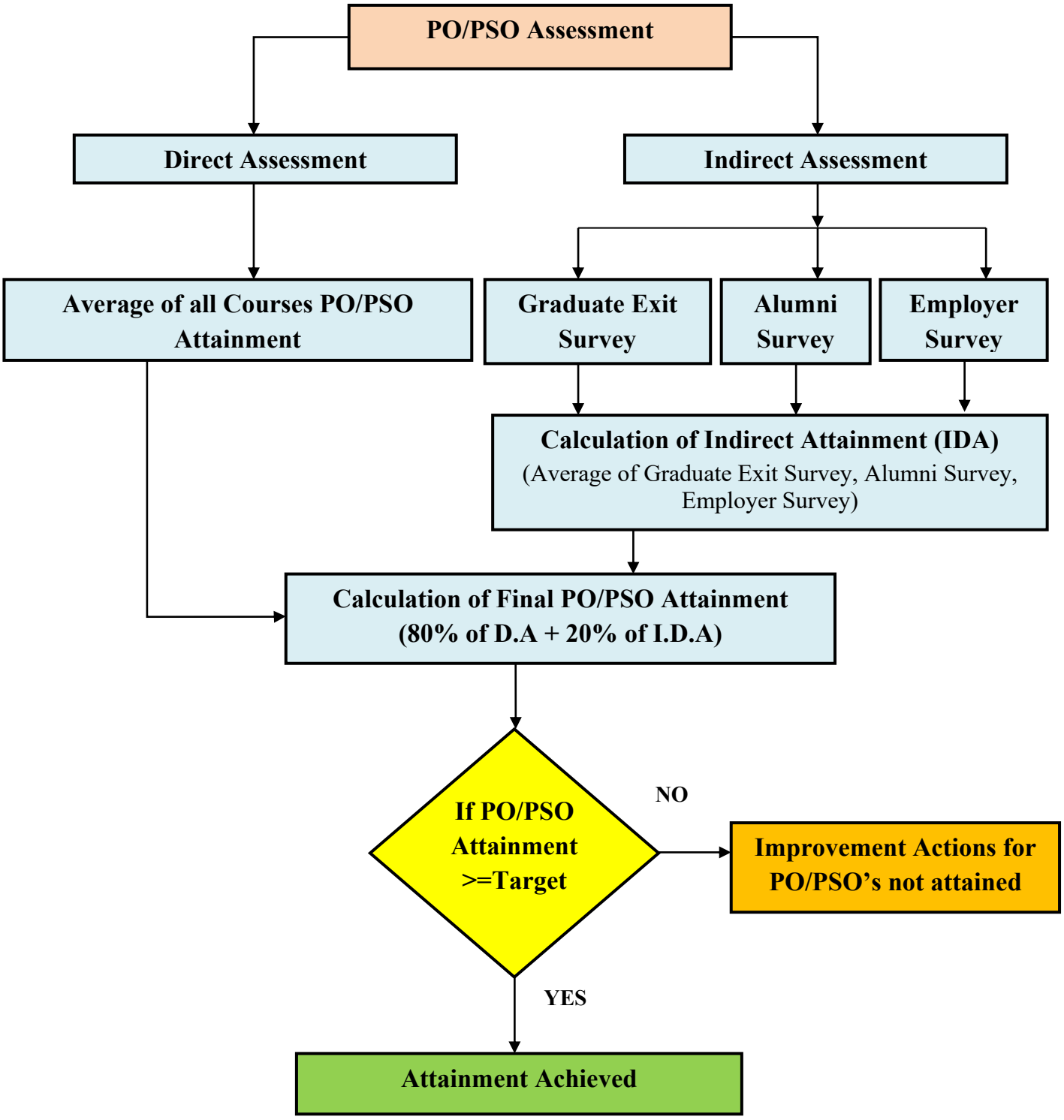

Fig 10.2:PO/PSO's Assessment Process

Direct Assessment (DA):
The attainment is calculated as the average of all course-level PO/PSO attainments, derived from evaluations such as exams, assignments, and projects within the curriculum.

Indirect Assessment (IDA):
Feedback is collected from stakeholders through:

- Graduate Exit Surveys (feedback from final-year students),
- Alumni Surveys (feedback from alumni on the relevance of their learning), and
- Employer Surveys (feedback from employers on graduates' performance).
  The IDA is the average of these survey results.

Final PO/PSO Attainment Calculation:
The final attainment score is determined by a weighted formula:

- 80% from Direct Assessment
- 20% from Indirect Assessment

Comparison with Target:

If the calculated attainment meets or exceeds the set target, the program outcomes are considered achieved. Otherwise, improvement actions are initiated to address the gaps.

This process ensures a systematic evaluation of learning outcomes, enabling continuous improvement in the education program.

B. THE QUALITY/RELEVANCE OF ASSESSMENT TOOLS/PROCESSES USED

R24 Regulation:

R24 REGULATION:

Sl. NO	Mode of Assessment	Course Type	Assessment Tool	Frequency of Assessment	Relevance with PO/PSO
1	Direct Assessment	Theory Courses	**Theory internal examinations (30M)**	Twice in a semester	PO1 to PO12 & PSO1 to PSO3
			Assignments (5M)	Twice in a semester	PO1 to PO12 & PSO1 to PSO3
			Case Study/Project (5M)	Twice in a semester	PO1 to PO12 & PSO1 to PSO3
			Semester End Examination (60M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
2		Laboratory Courses	**Day to day evaluation in Laboratory (10M)**	continuous	PO1 to PO12 & PSO1 to PSO3
			Internal Practical Examination (10M)	Once per semester	PO1 to PO12 & PSO1 to PSO3

			Project(10M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
			Viva/Case Study/ Poster (10M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
			External Practical Examination (60M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
3		**Project Courses**	**Innovative Product Development – I, II III, IV & V (100M)** Internal = 40M External = 60M	Once per semester from II Year I Sem. to IV Year I Sem.	PO1 to PO12 & PSO1 to PSO3
			Industry oriented Mini Project/Summer Internship (100M) Internal = 40M External = 60M	Mini Project Review in VII Semester	PO1 to PO12 & PSO1 to PSO3
			Research Project I (100M) Internal = 40M External = 60M **& Research Project II(150M)** Internal = 50M External = 100M	Research project I - VII semester & Research Project II- VIII semester	PO1 to PO12 & PSO1 to PSO3
			Innovation- Start-Up & Entrepreneurship (100M) Mentor Marks = 30M Dept. Committee Marks = 70M	IV Year II Semester	PO1 to PO12 & PSO1 to PSO3
4		**Technical Seminar**	**Technical Seminar (100M)** Internal	IV Year II Semester	PO1 to PO12 & PSO1 to PSO3
5	**Indirect Assessment**	**Course End Survey**		At end of every course	PO1 to PO12 & PSO1 to PSO3
6		**Graduate Exit Survey**		Once per Batch	PO1 to PO12 & PSO1 to PSO3
7		**Alumni Survey**		Once per Batch	PO1 to PO12 & PSO1 to PSO3
8		**Employer Survey**		Once per Batch	PO1 to PO12 & PSO1 to PSO3

Table 10.1: R24 RegulationAssessment Process

R22 REGULATION:

Sl. NO	Mode of Assessment	Course Type	Assessment Tool	Frequency of Assessment	Relevance with PO/PSO
1	Direct Assessment	Theory Courses	**Theory internal examinations(30M)**	Twice in a semester	PO1 to PO12 & PSO1 to PSO3
			Assignments(5M)	Twice in a semester	PO1 to PO12 & PSO1 to PSO3
			Case Study/PPT (5M)	Twice in a semester	PO1 to PO12 & PSO1 to PSO3
			SemesterEnd Examination (60M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
2		Laboratory Courses	**Day to day evaluation in Laboratory (10M)**	continuous	PO1 to PO12 & PSO1 to PSO3
			Internal Practical Examination(10M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
			Project(10M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
			Viva/Case Study/Poster (10M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
			External Practical Examination (60M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
3		Project Courses	**Innovative Product Development – I, II III, IV & V(100M)** Internal = 40M,External = 60M	Once per semester from II Year I Sem. to IV Year I Sem.	PO1 to PO12 & PSO1 to PSO3
			Industry oriented Mini Project/Summer Internship(100M) Internal = 40M External = 60M	Mini Project Review in VII Semester	PO1 to PO12 & PSO1 to PSO3
			Research Project I (100M) Internal = 40M External = 60M **Research Project II(150M)** Internal = 50M External = 100M	Research project I - VII semester &Research Project II- VIII semester	PO1 to PO12 & PSO1 to PSO3
			Innovation- Start-Up & Entrepreneurship(100M) Mentor Marks = 30M Dept. Committee Marks = 70M	IV Year II Semester	PO1 to PO12 & PSO1 to PSO3
4		Technical Seminar	**Technical Seminar(100M)** Internal = 100M	IV Year II Semester	PO1 to PO12 & PSO1 PSO3
5	Indirect Assessment	Course End Survey		At end of every course	PO1 to PO12 & PSO1 to PSO3

6		**Graduate Exit Survey**	Once per Batch	PO1 to PO12 & PSO1 to PSO3
7		**Alumni Survey**	Once per Batch	PO1 to PO12 & PSO1 to PSO3
8		**Employer Survey**	Once per Batch	PO1 to PO12 & PSO1 to PSO3

Table 10.2: R22 Regulation Assessment Process

R20 REGULATION:

Sl. NO	Mode of Assessment	Course Type	Assessment Tool	Frequency of Assessment	Relevance with PO/PSO
1	**Direct Assessment**	**Theory Courses**	**Theory internal examinations(25M)**	Twice in a semester	PO1 to PO12 & PSO1 to PSO3
			Assignments(5M)	Twice in a semester	PO1 to PO12 & PSO1 to PSO3
			SemesterEnd Examination(70M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
2		**Laboratory Courses**	**Day to day Evaluation in Laboratory (15M)**	continuous	PO1 to PO12 & PSO1 to PSO3
			Internal Practical Examination(15M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
			External Practical Examination(70M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
3		**Project Courses**	**Innovative Product Development – I, II & III (100M)** Internal = 30M, External = 70M	IPD-I during III Year I semester, IPD-II during III Year II semester, IPD-III during IV Year I semester	PO1 to PO12 & PSO1 to PSO3
			Industry oriented Mini Project/Summer Internship (100M) Internal = 30M, External = 70M	Mini Project Review in VII Semester	PO1 to PO12 & PSO1 to PSO3
			Project-I (100M) Internal = 30M, External = 70M **Research Project(150M)** Internal = 50M, External = 100M	project I -VII semester & Project II- VIII semester	PO1 to PO12 & PSO1 to PSO3
			Innovation- Start-Up & Entrepreneurship (100M) Mentor Marks = 30M Dept. Committee Marks = 70M	IV Year II Semester	PO1 to PO12 & PSO1 to PSO3
4		**Technical Seminar**	**Technical Seminar (100M)**	IV Year II Semester	PO1 to PO12 & PSO1

			Internal = 100M		to PSO3
5	**Indirect Assessment**	**Course End Survey**		At end of every course	PO1 to PO12 & PSO1 to PSO3
6		**Graduate Exit Survey**		Once per Batch	PO1 to PO12 & PSO1 to PSO3
7		**Alumni Survey**		Once per Batch	PO1 to PO12 & PSO1 to PSO3
8		**Employer Survey**		Once per Batch	PO1 to PO12 & PSO1 to PSO3

Table 10.3: R20 Regulation Assessment Process

R18 REGULATION:

Sl. NO	Mode of Assessment	Course Type	Assessment Tool	Frequency of Assessment	Relevance with PO/PSO
1	**Direct Assessment**	**Theory Courses**	**Theory internal examinations (25M)**	Twice in a semester	PO1 to PO12 & PSO1 to PSO3
			Assignments (5M)	Twice in a semester	PO1 to PO12 & PSO1 to PSO3
			Semester End Examination (70M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
2		**Laboratory Courses**	**Day to day evaluation in Laboratory (15M)**	continuous	PO1 to PO12 & PSO1 to PSO3
			Internal Practical Examination (15M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
			External Practical Examination (70M)	Once per semester	PO1 to PO12 & PSO1 to PSO3
3		**Project Courses**	**Industry oriented Mini Project/Summer Internship (100M)** Internal = 30M External = 70M	Mini Project Review in VII Semester	PO1 to PO12 & PSO1 to PSO3
			Project-I (100M) Internal = 30M, External = 70M **Project-II (150M)** Internal = 50M, External = 1000M	project I -VII semester & Project II- VIII semester	PO1 to PO12 & PSO1 to PSO3
4		**Technical Seminar**	**Technical Seminar (100M)** Internal = 100M	IV Year II Semester	PO1 to PO12 & PSO1 to PSO3
5	**Indirect**	**Course End Survey**		At end of every course	PO1 to PO12 & PSO1

	Assessment			to PSO3
6		**Graduate Exit Survey**	Once per Batch	PO1 to PO12 & PSO1 to PSO3
7		**Alumni Survey**	Once per Batch	PO1 to PO12 & PSO1 to PSO3
8		**Employer Survey**	Once per Batch	PO1 to PO12 & PSO1 to PSO3

Table 10.4: R18 Regulation Assessment Process

AverageofdirectattainmentsofPO$_i$obtainedforallCourses:

POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
Direct Attainment	**D_1**	**D_2**	**D_3**	**D_4**	**D_5**	**D_6**	**D_7**	**D_8**	**D_9**	**D_{10}**	**D_{11}**	**D_{12}**

Table 10.5: Direct Attainment D_i=Averageofdirectattainments of PO_i obtained forallCourses.

Indirect Attainment:

POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
Graduate Exit Survey	**AttainmentvaluesofGraduateExitSurvey**											
Alumni Survey	**AttainmentvaluesofAlumniSurvey**											
Employer Survey	**AttainmentvaluesofEmployer Survey**											
Overall Attainment	**I_1**	**I_2**	**I_3**	**I_4**	**I_5**	**I_6**	**I_7**	**I_8**	**I_9**	**I_{10}**	**I_{11}**	**I_{12}**

Table 10.6: Indirectassessmentisdonethrough Calculation of Average value of Graduate exitsurvey,Alumnisurvey and Employer Survey

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Graduate Exit Survey:

A exit survey is conducted for students who have graduated out of the departmentfor that year. Relevant questionnaire in exit survey form to evaluate attainment of POs and PSOs is given in below sections

Alumni Survey:

Feedback is taken from alumni. Relevant questionnaire in alumni survey form to evaluateattainmentofPOsandPSOs

Employer Survey:

Feedback is taken from Employers. Relevant questionnaire in Employer survey form to evaluateattainmentofPOsandPSOs

Evaluation Process:

The questionnaire consists of 12 questions which is relevant for assessing each PO and 3 questions for assessing each PSO. Each question is having 3 options namely Excellent, Very Good and satisfactory which is given marks 3,2,1 respectively. These survey results are tabulated and the average values corresponding to each PO and PSO are determined

Indirect Attainment Ii= Average of attainment of [Graduate Exit survey + Alumni survey + Employer Survey].

Overall PO and PSO attainment

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Direct Attainment	D_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_9	D_{10}	D_{11}	D_{12}
Indirect Attainment	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_9	I_{10}	I_{11}	I_{12}
Overall Attainment	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8	O_9	O_{10}	O_{11}	O_{12}

Table 10.7: OverallAttainmentofPO$_i$; O_i=80%ofD_i+20%ofI_i

whereD_i–DirectAttainmentofeachPO I_i–IndirectAttainmentofeachPO

SimilarlyPSOattainmentisalsoevaluated

POs	PSO1	PSO2	PSO3
Direct Attainment	D_1	D_2	D_3
Indirect Attainment	I_1	I_2	I_3
Overall Attainment	O_1	O_2	O_3

Table 10.8: Overall Attainment of PSOs; Oi = 80% of Di + 20% of Ii

where Di – Direct Attainment of each PSO Ii – Indirect Attainment of each PSO

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Maisammaguda, Dhulapally, Secunderabad 500100.

GRADUATE EXIT SURVEY
BATCH: 2019-23

Name(in Full):
Roll No:
Branch:
Mail-id:

Assessment of Program Outcomes (PO's & PSO's):

Rate the following Program Outcomes: These outcomes are the abilities/attributes expected by engineering professionals upon completion of their program.

Excellent (3), Very Good (2), Satisfactory (1)

POs	Program Outcomes(POs)	3	2	1
PO1	I have gained knowledge of mathematics, science, and engineering for solving Engineering problems and modeling			
PO2	I have an ability to design, simulate and conduct experiments, as well as to analyze and interpret data including hardware and software components			
PO3	I am able to apply engineering knowledge to design a complex electronic system or process to meet desired specifications and needs			
PO4	I am able to identify, formulate, comprehend, analyze, design synthesis of the information to solve complex engineering problems and provide valid conclusions.			
PO5	I have the opportunity to use the techniques, skills and modern engineering tools necessary for engineering practice			
PO6	Able to show the understanding of professional, health, safety, legal, cultural and social responsibilities			
PO7	I am able to understand the impact of engineering solutions in a global, economic, environmental and demonstrate the knowledge need for sustainable development			
PO8	I am able to apply ethical principles, responsibility and norms of the			

	engineering practice			
PO9	I can able to function on multi-disciplinary teams.			
PO10	I can able to communicate and present effectively			
PO11	I am able to use the modern engineering tools, techniques, skills and management principles to do work as a member and leader in a team, to manage projects in multi-disciplinary environments			
PO12	I have an ability to engage in, to resolve contemporary issues and lifelong learning			

Table 1: Assessment of Program Outcomes

Rate the following Program Specific Outcomes: These outcomes are the abilities/attributes exhibited by graduates of ECE Department of MRECW after completion of their program.

Excellent (3), Very Good (2), Satisfactory (1)

PSOs	Program Specific Outcomes(POs)	3	2	1
PSO1	I am able to analyze, design and implement application specific electronic system for complex engineering problems for analog, digital domain, communications and signal processing applications by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals.			
PSO2	I am able to adapt for rapid changes in tools and technology with an understanding of societal and ecological issues relevant to professional engineering practice through life-long learning			
PSO3	I am able to function in multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities			

Table 1: Assessment of Program Outcomes

Signature of Student

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
(Autonomous Institution-UGC, Govt. of India)
Accredited by NAAC with 'A+' Grade | Programmes Accredited by NBA
National Ranking by NIRF Innovation – Rank band(151-300), MHRD, Govt. of India
Approved by AICTE, Affiliated to JNTUH, ISO 9001:2015 Certified Institution
Maisammaguda, Dhulapally, Secunderabad 500100.

ALUMNI SURVEY

A.Y:2023-24

Name of the Alumni:
Batch:
Branch:
Mail-id:
Working Organization:
Position:

Assessment of Program Outcomes (PO's & PSO's):

Rate the following Program Outcomes: These outcomes are the abilities/attributes expected by engineering professionals upon completion of their program

Kindly rate the following criteria on a scale of given below. Your genuine response will be helpful for the continuous quality improvement of our UG programme in ECE.

3. Excellent 2. Very Good 1. Good

S.No	Program Outcomes(POs)	POs	Rating
1.	How do you rate the engineering knowledge obtained during course period?	**PO1**	
2.	How do you find the programme related to problem analysis?	**PO2**	
3.	Were able to design solutions for complex engineering problems?	**PO3**	
4.	Did you use research based knowledge for interpreting your data during project work?	**PO4**	
5.	How this programme helped in applying modern tool usage for your problems?	**PO5**	
6.	How do you rate your understanding of impact of engineering solutions in a global on the society, economic, environmental aspects?	**PO6**	
7.	Did you understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and	**PO7**	

	need for sustainable development.		
8.	Were you able to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice?	**PO8**	
9.	Did you have opportunity to function as an individual or in a team?	**PO9**	
10	How do you rate your skill of communicating effectively in speech and in writing, including documentation of hardware and software systems?	**PO10**	
11	Were you able to manage project and finance aspects effectively in your work environment?	**PO11**	
12	How far this programme helped you to acquire new knowledge in the engineering discipline and to engage in life- long learning?	**PO12**	

Table 1: Assessment of Program Outcomes

Rate the following Program Specific Outcomes: These outcomes are the abilities/attributes exhibited by graduates of ECE Department of MRECW after completion of their program.

S.No	Program Specific Outcomes(PSOs)	PSOs	Rating
1.	Are our graduates are able to analyze, design and implement application specific electronic system for complex engineering problems for analog, digital domain, communications and signal processing applications by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals?	**PSO1**	
1.	Are our graduates are able to adapt for rapid changes in tools and technology with an understanding of societal and ecological issues relevant to professional engineering practice through life-long learning?	**PSO2**	
3.	Are our graduates are able to function in multidisciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities?	**PSO3**	

Table 2: Assessment ofProgram Specific Outcomes

Any Suggestions:

Signature of Alumni

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
(Autonomous Institution-UGC, Govt. of India)
Accredited by NAAC with 'A+' Grade | Programmes Accredited by NBA
National Ranking by NIRF Innovation – Rank band(151-300), MHRD, Govt. of India
Approved by AICTE, Affiliated to JNTUH, ISO 9001:2015 Certified Institution
Maisammaguda, Dhulapally, Secunderabad 500100.

EMPLOYER SURVEY

A.Y:2023-24

Name of the Company:
Type of Company:
Name of the Employer:
Mail-id:

Assessment of Program Outcomes (PO's & PSO's):

Rate the following Program Outcomes: These outcomes are the abilities/attributes expected by engineering professionals upon completion of their program

Indicate how well do you agree with each Program Outcomes POs as a predicted accomplishment for this program as per below given criterion.

3- Extremely Relevant 2-Moderately Relevant 1-Slightly Relevant

S. No	Programme Outcome	Rating
1	**PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.	
2	**PO2: Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	
3	**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 public health and safety, and cultural, societal, and environmental considerations.	
4	**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.	

5	**PO5: 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	**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.	
7	**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.	
8	**PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	
9	**PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	
10	**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.	
11	**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.	
12	**PO12 - 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.	

Table 1:PROGRAM SPECIFIC OUTCOMES

Indicate how well do you agree with each Program Specific Outcomes PSOs as a predicted accomplishment for this program as per below given criterion

3- Extremely Relevant 2-Moderately Relevant 1-Slightly Relevant

S.No	Program Specific Outcomes(PSOs)	Rating
1.	**PSO1:** The ability to analyze, design and implement application-specific electronic systems for complex engineering problems for analog, digital domain, communications, and signal processing applications by applying the knowledge of basic sciences, engineering mathematics, and engineering fundamentals.	

2.	**PSO2:** The ability to adapt for rapid changes in tools and technology with an understanding of societal and ecological issues relevant to professional engineering practice through life-long learning.	
3.	**PSO3:** Excellent adaptability to function in a multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities.	

Table 2:Program Specific Outcomes

Any Suggestions:

Signature of Employer

11. CONTINUOUS IMPROVEMENTS OF PO'S & PSO'S

Continuous Improvement is one of the major aspects in the progress of the Institution. As Program Outcomes and Program Specific Outcomes are the expected attribute of the student immediately after completion of the program. Hence there should be a mechanism in the program to fix the targets for POs and PSOs at the beginning of the academic year for continuous improvement and check the attainment of the PO & PSOs at the after completion of the academic year. In case if the major POs/PSOs were attained higher level to be fixed for the next academic year and in case of any PO or PSO were not attained corrective action should be planned and executed.

1. After finalizing the CO PO, CO - PSO mapping, additional activities to fill the gaps in the curriculum, by assessment committee, maximum attainment level of all POs& PSOs shall be obtained by taking the average of all the courses mapped as per the CO - PO, PSO table through direct assessments.

2. Target attainment level of individual PO & PSO shall be fixed by the Department Advisory Board by taking average value of previous batch attainments and current batch result analysis.

3. As the PO & PSO were attainted through courses, and assessment committee have grouping of courses into Science & Humanities, Basic Engineering, Core Engineering, Allied Engineering, Management, Project & Seminar, they may fix varied targets for the groups with proper justification without any disturbance to the overall target attainment at PO & PSO level.

4. Assessment committee shall also fix the target attainment level of all the courses being run for the program as per the targets fixed for different groups of courses and forward a copy to department committee for circulation among course coordinators.

5. After completion of the course and announcement of result assessment committee coordinator shall collect Course wise attainment sheet from the course coordinator duly verified & signed by the head of the department, along with attainment analysis and course end suggestions in the stipulated time as instructed by head of the department.

6. After obtaining all the attainments from individual course coordinators and committee members they need to consolidate and arrive the direct attainment level of each PO and PSO. Also inputs for indirect attainment to be collected from Department Committee from the respective stake holders. As per the weightages they need to finalize the overall attainment of POS and PSOS for the program. Non attained POS and PSOS to be listed out and mark a copy to Department Committee.
7. Reasons for non-attainment of POs and PSOs if any has to be thoroughly discussed in the assessment committee meeting inviting respective course coordinators whose courses were not attained. Head of the department may seek explanation along with difficulties faced during the course and suggestion for improvement when handled next in document form

8. Assessment committee needs to document the attainment analysis of all POs and need to propose corrective action plan for the next academic year.

9. Based on the attainment levels of POs& PSOs in the current year targets shall be fixed for the next academic year with increased levels.

PO and PSO attainment Batch Wise Analysis

PO's	**Target Level**	**Attainment Level**	**Observation**
POx: Statement			
POx	Target Value	Attainment Value	**Remarks**
Action-1: **Action-2:** **Action-3:**			

Table 11.1:PO and PSO attainment Batch Wise Analysis

Sample:

POs	**Target Level**	**Attainment Level**	**Observation**
PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
PO1	**1.82**	**1.53**	Requires awareness of Mathematics and Engineering fundamentals in Engineering problems.
Action 1: Extra classes to be conducted for slow learners beyond the regular planned classes. **Action 2:** Additional Maths classes are conducted during the semester after every internal based on the performance. **Action 3:** Additional topic specific tests have been conducted.			

Table 11.2:Sample copy

12. SAMPLE CO-PO/PSO COMPUTATION

Course: Signals & Systems

DIRECT ASSESSMENT

CONTINUOUS INTERNAL ASSESSMENT-1

		DESCRIPTIVE											
S.No	QUESTION NO.	Q1(A)	Q1(B)	Q2(A)	Q2(B)	Q3(A)	Q3(B)	Q4(A)	Q4(B)	Q5(A)	Q5(B)	Q6(A)	Q6(B)
	ENTER MAX. MARKS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	HT. NO.												
1	20RH1A0401		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
2	20RH1A0402	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
3	20RH1A0403			2.5	2.5		2.5	2.5	2.5	2.5			
4	20RH1A0404		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
5	20RH1A0405			2.5	2.5	2.5	2	2.5	2	2			
6	20RH1A0406		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
7	20RH1A0407		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
8	20RH1A0408		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
9	20RH1A0409	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
10	20RH1A0410			2.5	2.5		2.5	2.5	2.5	2.5			
11	20RH1A0411	2.5	2.5	2	2					2	2	2.5	2.5
12	20RH1A0412		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
13	20RH1A0413		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
14	20RH1A0414			2.5	2.5		2.5	2.5	2.5	2.5			
15	20RH1A0415		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
16	20RH1A0416	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
17	20RH1A0417	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
18	20RH1A0418	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
19	20RH1A0419		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
20	20RH1A0420	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
21	20RH1A0421			2.5	2.5		2.5	2.5	2.5	2.5			
22	20RH1A0422	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
23	20RH1A0423		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
24	20RH1A0424		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
25	20RH1A0425	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
26	20RH1A0426			2.5	2.5		2.5	2.5	2.5	2.5			
27	20RH1A0427	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
28	20RH1A0428		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
29	20RH1A0429	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
30	20RH1A0430	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
31	20RH1A0431		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
32	20RH1A0432	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
33	20RH1A0433	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
34	20RH1A0434	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
35	20RH1A0435		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
36	20RH1A0436	2.5	2.5	2	2					2	2	2.5	2.5
37	20RH1A0437					2.5	2.5	2					
38	20RH1A0438	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
39	20RH1A0439	2.5	2.5	2	2					2	2	2.5	2.5
40	20RH1A0440	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
41	20RH1A0441			2.5	2.5	2.5	2	2.5	2	2			
42	20RH1A0442	2.5	2	2	2					2	2	2	2.5
43	20RH1A0443			2.5	2.5	2.5	2	2.5	2	2			
44	20RH1A0444	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
45	20RH1A0445	2.5	2	2	2					2	2	2	2.5
46	20RH1A0446		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
47	20RH1A0447	2.5	2	2	2					2	2	2	2.5
48	20RH1A0448		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
49	20RH1A0449	2.5	2.5	2	2					2	2	2.5	2.5
50	20RH1A0450	2.5	2.5	2	2					2	2	2.5	2.5

51	20RH1A0451			2.5	2.5	2.5	2	2.5	2	2			
52	20RH1A0452		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
53	20RH1A0453	2.5	2.5	2	2					2	2	2.5	2.5
54	20RH1A0454	2.5	2	2	2					2	2	2	2.5
55	20RH1A0455	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
56	20RH1A0456	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
57	20RH1A0457		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
58	20RH1A0458			2.5	2.5	2.5	2	2.5	2	2			
59	20RH1A0459	2.5	2	2	2					2	2	2	2.5
60	20RH1A0460	2.5	2.5	2	2					2	2	2.5	2.5
	Target Marks	**2.35**	**2.35**	**2.35**	**2.35**	**2.35**	**2.35**	**2.35**	**2.35**	**2.35**	**2.35**	**2.35**	**2.35**
	No. of Students Achieved Target Marks	**31**	**44**	**28**	**28**	**43**	**24**	**47**	**42**	**23**	**18**	**26**	**12**
	% of Students achieved Target Marks	**100.0**	**89.8**	**70.0**	**70.0**	**100.0**	**50.0**	**97.9**	**89.4**	**57.5**	**36.7**	**83.9**	**100.0**
	Question wise Attainment Level	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**1**	**3**	**3**
	CO MAPPING	**CO1**	**CO1**	**CO1**	**CO1**	**CO2**	**CO2**	**CO2**	**CO2**	**CO3**	**CO3**	**CO3**	**CO3**

Target Marks for Question $= \left[\frac{Class\ Average\ Marks}{Maximum\ marks}\right] \times Maximum\ marks\ of\ the\ Question$

Percentage of Students Achieved Target Marks$= \left[\frac{No.of\ Students\ reached\ Target\ Marks}{No.of\ Students\ attempted\ the\ Question}\right] \times 100$

		OBJECTIVE										A	TOTAL MARKS
S.No	**QUESTION NO.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
	ENTER MAX. MARKS	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**5**	**30**
	HT. NO.												
1	20RH1A0401	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
2	20RH1A0402	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
3	20RH1A0403	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**25**
4	20RH1A0404	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
5	20RH1A0405	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**26**
6	20RH1A0406	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
7	20RH1A0407	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
8	20RH1A0408	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
9	20RH1A0409	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
10	20RH1A0410	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**25**
11	20RH1A0411	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
12	20RH1A0412	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
13	20RH1A0413	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
14	20RH1A0414	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**25**
15	20RH1A0415	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
16	20RH1A0416	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
17	20RH1A0417	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
18	20RH1A0418	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
19	20RH1A0419	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
20	20RH1A0420	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
21	20RH1A0421	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**25**
22	20RH1A0422	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
23	20RH1A0423	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
24	20RH1A0424	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
25	20RH1A0425	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
26	20RH1A0426	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**25**
27	20RH1A0427	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
28	20RH1A0428	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
29	20RH1A0429	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
30	20RH1A0430	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**

31	20RH1A0431	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
32	20RH1A0432	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
33	20RH1A0433	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
34	20RH1A0434	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
35	20RH1A0435	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
36	20RH1A0436	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
37	20RH1A0437	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**17**
38	20RH1A0438	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
39	20RH1A0439	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
40	20RH1A0440	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
41	20RH1A0441	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**26**
42	20RH1A0442	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**27**
43	20RH1A0443	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**26**
44	20RH1A0444	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
45	20RH1A0445	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**27**
46	20RH1A0446	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
47	20RH1A0447	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**27**
48	20RH1A0448	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
49	20RH1A0449	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
50	20RH1A0450	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
51	20RH1A0451	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**26**
52	20RH1A0452	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
53	20RH1A0453	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
54	20RH1A0454	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**27**
55	20RH1A0455	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
56	20RH1A0456	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
57	20RH1A0457	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
58	20RH1A0458	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**26**
59	20RH1A0459	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**27**
60	20RH1A0460	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
	Target Marks	**0.47**	**0.47**	**0.47**	**0.47**	**0.47**	**0.47**	**0.47**	**0.47**	**0.47**	**0.47**	**4.71**	**28.23**
	No. of Students Achieved Target Marks	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**37**
	% of Students achieved Target Marks	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**61.7**
	Question wise Attainment Level	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**
	CO MAPPING	**CO1**	**CO1**	**CO1**	**CO1**	**CO2**	**CO2**	**CO2**	**CO2**	**CO3**	**CO3**		

Target Marks for Question $= \left[\frac{Class\ Average\ Marks}{Maximum\ marks}\right] \times Maximum\ marks\ of\ the\ Question$

Percentage of Students Achieved Target Marks$= \left[\frac{No.of\ Students\ reached\ Target\ Marks}{No.of\ Students\ attempted\ the\ Question}\right] \times 100$

Final CO ATTAINMENT	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
PERCENTAGE	**95.7**	**99.7**	**88.3**			

Calculation of CO_n attainment will be average of respective CO_n attainments

TARGET PERCENTAGE	**94**	**TARGET= Average Marks %**

CO ATTAINMENT	%	LEVEL
CO1	95.7	3
CO2	99.7	3
CO3	88.3	3
CO4		
CO5		
CO6		

Attainment Level:
3 for (>=70% and <=100%), 2 for (<70% and >=50%), 1 for (<50% and >0%)

DIRECT ASSESSMENT

CONTINUOUS INTERNAL ASSESSMENT-2

		DESCRIPTIVE											
S.No	QUESTION NO.	Q1(A)	Q1(B)	Q2(A)	Q2(B)	Q3(A)	Q3(B)	Q4(A)	Q4(B)	Q5(A)	Q5(B)	Q6(A)	Q6(B)
	ENTER MAX. MARKS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	HT. NO.												
1	20RH1A0401		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
2	20RH1A0402	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
3	20RH1A0403			2.5	2.5		2.5	2.5	2.5	2.5			
4	20RH1A0404		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
5	20RH1A0405			2.5	2.5	2.5	2	2.5	2	2			
6	20RH1A0406		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
7	20RH1A0407		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
8	20RH1A0408		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
9	20RH1A0409	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
10	20RH1A0410			2.5	2.5		2.5	2.5	2.5	2.5			
11	20RH1A0411	2.5	2.5	2	2					2	2	2.5	2.5
12	20RH1A0412		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
13	20RH1A0413		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
14	20RH1A0414			2.5	2.5		2.5	2.5	2.5	2.5			
15	20RH1A0415		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
16	20RH1A0416	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
17	20RH1A0417	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
18	20RH1A0418	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
19	20RH1A0419		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
20	20RH1A0420	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
21	20RH1A0421			2.5	2.5		2.5	2.5	2.5	2.5			
22	20RH1A0422	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
23	20RH1A0423		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
24	20RH1A0424		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
25	20RH1A0425	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
26	20RH1A0426			2.5	2.5		2.5	2.5	2.5	2.5			
27	20RH1A0427	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
28	20RH1A0428		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
29	20RH1A0429	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
30	20RH1A0430	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
31	20RH1A0431		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
32	20RH1A0432	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
33	20RH1A0433	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
34	20RH1A0434	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
35	20RH1A0435		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
36	20RH1A0436	2.5	2.5	2	2					2	2	2.5	2.5

37	20RH1A0437					2.5	2.5	2					
38	20RH1A0438	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
39	20RH1A0439	2.5	2.5	2	2					2	2	2.5	2.5
40	20RH1A0440	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
41	20RH1A0441			2.5	2.5	2.5	2	2.5	2	2			
42	20RH1A0442	2.5	2	2	2					2	2	2	2.5
43	20RH1A0443			2.5	2.5	2.5	2	2.5	2	2			
44	20RH1A0444	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
45	20RH1A0445	2.5	2	2	2					2	2	2	2.5
46	20RH1A0446		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
47	20RH1A0447	2.5	2	2	2					2	2	2	2.5
48	20RH1A0448		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
49	20RH1A0449	2.5	2.5	2	2					2	2	2.5	2.5
50	20RH1A0450	2.5	2.5	2	2					2	2	2.5	2.5
51	20RH1A0451			2.5	2.5	2.5	2	2.5	2	2			
52	20RH1A0452		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
53	20RH1A0453	2.5	2.5	2	2					2	2	2.5	2.5
54	20RH1A0454	2.5	2	2	2					2	2	2	2.5
55	20RH1A0455	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
56	20RH1A0456	2.5	2.5			2.5	2	2.5	2.5		2	2.5	
57	20RH1A0457		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
58	20RH1A0458			2.5	2.5	2.5	2	2.5	2	2			
59	20RH1A0459	2.5	2	2	2					2	2	2	2.5
60	20RH1A0460	2.5	2.5	2	2					2	2	2.5	2.5
	Target Marks	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**
	No. of Students Achieved Target Marks	**31**	**44**	**28**	**28**	**43**	**24**	**47**	**42**	**23**	**18**	**26**	**12**
	% of Students achieved Target Marks	**100.0**	**89.8**	**70.0**	**70.0**	**100.0**	**50.0**	**97.9**	**89.4**	**57.5**	**36.7**	**83.9**	**100.0**
	Question wise Attainment Level	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**1**	**3**	**3**
	CO MAPPING	**CO4**	**CO4**	**CO4**	**CO4**	**CO5**	**CO5**	**CO5**	**CO5**	**CO6**	**CO6**	**CO6**	**CO6**

Target Marks for Question $= \left[\frac{Class\ Average\ Marks}{Maximum\ marks}\right] \times Maximum\ marks\ of\ the\ Question$

Percentage of Students Achieved Target Marks$= \left[\frac{No.of\ Students\ reached\ Target\ Marks}{No.of\ Students\ attempted\ the\ Question}\right] \times 100$

		OBJECTIVE										A	TOTAL MARKS
S.No	**QUESTION NO.**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
	ENTER MAX. MARKS	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**5**	**30**
	HT. NO.												
1	20RH1A0401	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
2	20RH1A0402	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
3	20RH1A0403	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**25**
4	20RH1A0404	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
5	20RH1A0405	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**26**
6	20RH1A0406	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
7	20RH1A0407	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
8	20RH1A0408	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
9	20RH1A0409	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
10	20RH1A0410	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**25**
11	20RH1A0411	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
12	20RH1A0412	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
13	20RH1A0413	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
14	20RH1A0414	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**25**
15	20RH1A0415	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
16	20RH1A0416	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**

17	20RH1A0417	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
18	20RH1A0418	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
19	20RH1A0419	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
20	20RH1A0420	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
21	20RH1A0421	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**25**
22	20RH1A0422	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
23	20RH1A0423	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
24	20RH1A0424	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
25	20RH1A0425	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
26	20RH1A0426	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**25**
27	20RH1A0427	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
28	20RH1A0428	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
29	20RH1A0429	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
30	20RH1A0430	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
31	20RH1A0431	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
32	20RH1A0432	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
33	20RH1A0433	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
34	20RH1A0434	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
35	20RH1A0435	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
36	20RH1A0436	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
37	20RH1A0437	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**17**
38	20RH1A0438	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
39	20RH1A0439	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
40	20RH1A0440	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
41	20RH1A0441	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**26**
42	20RH1A0442	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**27**
43	20RH1A0443	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**26**
44	20RH1A0444	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
45	20RH1A0445	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**27**
46	20RH1A0446	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
47	20RH1A0447	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**27**
48	20RH1A0448	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
49	20RH1A0449	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
50	20RH1A0450	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
51	20RH1A0451	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**26**
52	20RH1A0452	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
53	20RH1A0453	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
54	20RH1A0454	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**27**
55	20RH1A0455	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
56	20RH1A0456	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**29**
57	20RH1A0457	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**30**
58	20RH1A0458	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**26**
59	20RH1A0459	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**27**
60	20RH1A0460	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5	**28**
	Target Marks	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**4.7**	**28.23**
	No. of Students Achieved Target Marks	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**37**
	% of Students achieved Target Marks	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**61.7**
	Question wise Attainment Level	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**
	CO MAPPING	**CO4**	**CO4**	**CO4**	**CO5**	**CO5**	**CO5**	**CO6**	**CO6**	**CO6**	**CO6**		

Target Marks for Question $= \left[\frac{Class\ Average\ Marks}{Maximum\ marks}\right] \times Maximum\ marks\ of\ the\ Question$

Percentage of Students Achieved Target Marks$= \left[\frac{No.of\ Students\ reached\ Target\ Marks}{No.of\ Students\ attempted\ the\ Question}\right] \times 100$

Final CO ATTAINMENT	CO1	CO2	CO3	CO4	CO5	CO6
PERCENTAGE				91.2	92.2	86.5

CO ATTAINMENT	%	LEVEL
CO1		
CO2		
CO3		
CO4	91.2	3
CO5	92.2	3
CO6	86.5	3

Calculation of CO_n attainment will be average of respective CO_n attainments

FINAL CO INTERNAL ATTAINMENT	%	LEVEL
CO1	95.7	3
CO2	99.7	3
CO3	88.3	3
CO4	91.2	3
CO5	92.2	3
CO6	86.5	3

TARGET PERCENTAGE	94	TARGET= AVERAGE MARKS %

Attainment Level: 3 for (>=70% and <=100%), 2 for (<70% and >=50%), 1 for (<50% and >0%)

DIRECT ASSESSMENT

SEMESTER END EXAMINATION (SEE)

S.No	SCRIPT NO./OMR CODE	Q1(A)	Q1(B)	Q1(C)	Q1(D)	Q1(E)	Q1(F)	Q1(G)	Q1(H)	Q2(A)	Q2(B)	Q3(A)	Q3(B)	Q4(A)	Q4(B)	Q5(A)	Q5(B)	Q6(A)	Q6(B)	Q7(A)	Q7(B)	Q8(A)	Q8(B)	Q9(A)	Q9(B)	Q10(A)	Q10(B)	Q11(A)	Q11(B)	TOTAL MARKS
		2	2	2	2	2	2	2	2	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	70
1	Script1	2	2	2	2	2	2	2	2	4	4			4	5	5		5	4	5		5		5	5	5	4			49
2	Script2	2		2	2		2	2	2	4	4			5	4	4		5	5	4		4		5	4	4	5			51
3	Script3	2		2	1	1		1	1	4	4			5	4	4				4	4	4		5	5	4	5			45
4	Script4	2	2	2	2	2	1	2	1		5	4			5	5	5	5		5		5		4	5	5		5	5	33
5	Script5	2	2	2	2	2	1	1	1			4	5			4	4	5	5	4		4		4	5	4	4	5		55
6	Script6	2	2	2				1	2			5	5	5	4	5		5	4	5		5		4	4	5	4			54
7	Script7	2		1	2	1		1	1			4	4	5	4	4		4	4	4		4		4	5	4	4			49
8	Script8	2	2	2	1	1	2	2		5	4						4				5			5	5			5	5	41
9	Script9	1	1	1		1		1		5	5			5	4	5		4	4	5		5		4	5	5	4			46
10	Script10	2	2	2	2	2	2	2	2	5	4	4	5	4	4	5	1	4	5	5	5	5		4	4	5	5			46
11	Script11	2	2		2			1	2			5	5	5	4	5		5	4	5		5		4	4	5	4			52
12	Script12	2	2		1			2	2			5	5	4	5	5				5	5	5		4	5	5	5			39
13	Script13	2	2	2	1	1	2	1	1	5	5	5	4	4	4	4	5	5	5	4	5	4	5	4	4	4	5	5	5	46
14	Script14	1								4	4		4	4				4	5		4			5						25
15	Script15	2	2			2		1	1			4	4	5	5	5		5	5	5		5	4			5	5			42
16	Script16	2	2	2	2	2	1	2	2	4	4	4	5			4				4	5	4		4	5	4	4			39
17	Script17	2	2	2		2		2		5	5	5	4	5	5	5		5	5	5		5	5			5	5			38
18	Script18	2	2	2	2	2	2	2	2	5	5		5	5	5	4		5	5	4		4	5	4		4	5			45
19	Script19	2	1	2	2		1	2	2	4	4			4	5	4		5	5	4		4		5	4	4	5			47
20	Script20	2		2	2			2	2	4	4			6	6	5		5	6	5		5		5	6	5	6			63
21	Script21	1	2		2	1		2	1			4	5	5	5	5				5	1	5		6	6	5	1	5		40
22	Script22	2	1				2		2			5	4	4		5		5	5	5	5	5	5	5	5	5	5			42
23	Script23	2	2					1	2			5	5	4	5	5		5	4	5		5		4	4	5	5			43
24	Script24	2		2	1			2	2			5	5	4	5	5				5	5	5		5	4	5	4			48
25	Script25	2	2	1	1		1	2	2	5	5		5	5	4	6		4	5	6	4	6		5	5	6	5			54
26	Script26	2	1	1								5	5	5	4	6		5	5	6		6		4	4	6	4			40
27	Script27	2	2	2	2	2	1					5	5	5	4	5				5	5	5		4	5	5	5			47
28	Script28	2	2			1	2	2	2	5	4			4	5	5		5	5	5		5	5	1	1	5	5			50
29	Script29	2	1			1	2	2	2			5	4			5	4			5	4	5		5	5	5	5	5		53
30	Script30	2	2	2	2	2	1	2	2	5	5	4	4	5	5	5		4	5	5	1	5	4	5	4	5	5		5	56
31	Script31	2	1	1		2	2	1	1	5	5				5	5	5	5	4	5	5	5		5	5	5	5			43
32	Script32	2		2	1	1	1	1	1			4	5	5	5	5		5	5	5		5		5	4	5	5			51
33	Script33	2	1	2	2	1	2		2			4	4	4	5	5				5	5	5		5	5	5	5			54
34	Script34	2		2		2	2	2				5	5	5	5	5		4	5	5		5		5	4	5	4			55
35	Script35	2	1	1	2	1		2	1	4	4			5	4	4		5	4	4		4		5	4	4	4			49
36	Script36	2	1	2	2			2	2	1		4	5	4	5	4		5	4	4		4		5	4	4	5			46
37	Script37	2		1		1	1	2	2		5	5			5	4		4	4	4		4		5	5	4	5			39
38	Script38	2		1		2	1		1			5	4			5	5	4	4	5		5		4	4	5	5			49
39	Script39	2	1			2	2	1	2	5	4	5	5	1	5	5	1	5	4	5		5	5	5	5	5	5			40
40	Script40	2	1	1		1	1	2	2			5	1	4	5	5	5	1	5	5		5	4	5	1	5	4			42
41	Script41	2	1	2	2	2	2	2				4	4	4	5			4	5											36
42	Script42	2	1	1	2			1	1			4	5	4	5	5		4	5	5		5		5	5	5	4			51
43	Script43	2	1	2			2	1	1	5	4			5	4	5		5	5	5		5		5	5	5	5		5	45
44	Script44	2			2		1	2	2	4	5			4	5	4		4	5	4		4		5	5	4	4			54
45	Script45	2		1		1	1	1	2	5	4			5	5	5		5	5	5		5		5	5	5	4			53
46	Script46	2		2	2			1	2			5	4	5	5	5		4	5	5		5	5			5	5			49
47	Script47	2		2	2	1		2	2	5	4	4		4	5	5		5	5	5		5		5	5	5				47
48	Script48	2	1	2	1	2	1	2	1	5	5	4	5	4	5	5	4	5	5	5	5	5	5	5	4	5	5			55
49	Script49	2	2	2	1	1	1	1	2	5	4	4	5	5	5	4		5	4	4		4	5	4	4	4	5			42
50	Script50	2		2	2	2		2	2			5	4	5	5	5		4	4	5		5	4	5	5	5	5			54
51	Script51	2		1			1	2	2			5	4	5	4	5		4	5	5		5		5	4	5	5			50
52	Script52	2	2	2	1	1	1	1	2	4	4	4		5	4	5	5	5	5	5		5	1	5		5	1			40
53	Script53	2	2	2		1		1	2	5	5			5	4	5		5	5	5		5	4			5	5	5	1	47
54	Script54	2		2	2		2	2	2	4	4				5	5		5	5	5		5		5	5	5	5			44
55	Script55	2	1				2	2	2	4	4				5	5		5	5	5		5	5	5	4	5				44
56	Script56	2		2	1	1	1	2	2		5	5	5	5	5	5		4	4	5		5		5	4	5	4			51
57	Script57	2		1		2	1	2	2	5	4					4	5	4	5	4		4		5	4	4	4			52
58	Script58	2	2	2	2	1	2	2	2	4	4	4	4	4	5	5			5	5		5				5	5			40
59	Script59	2		2	2	1			1			5	4	5	4	5		5	5	5		5		5	5	5	5			54
60	Script60	2		2		2	1	2	2	5	4			5	5	5			5	5		5	4	4	4	5	4	5	5	52
	Target Marks	1.34	1.34	1.34	1.34	1.34	1.34	1.34	1.34	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	4.01	46.77
	No. of Students Achieved Target Marks	57	23	35	26	19	18	34	37	19	13	21	21	29	35	43	7	31	35	43	11	43	10	36	27	43	34	8	6	32
	% of Students achieved Target Marks	95.00	58.97	72.92	70.27	47.50	47.37	64.15	71.15	57.58	37.14	53.85	55.26	59.18	67.31	75.44	53.85	63.27	70.00	75.44	64.71	75.44	58.82	66.67	52.94	75.44	62.96	100.00	85.71	53.33
	Question wise Attainment Level	3	2	3	3	1	1	2	3	2	1	2	2	2	2	3	2	2	3	3	2	3	2	2	2	3	2	3	3	2
	CO MAPPING	CO1	CO2	CO3	CO3	CO4	CO4	CO5	CO6	CO1	CO1	CO1	CO1	CO2	CO2	CO2	CO2	CO3	CO3	CO4	CO4	CO5	CO5	CO5	CO5	CO6	CO6	CO6	CO6	

Target Marks for Question $= \left[\frac{Class\ Average\ Marks}{Maximum\ marks}\right] \times Maximum\ marks\ of\ the\ Question$

Percentage of Students Achieved Target Marks$= \left[\frac{No.of\ Students\ reached\ Target\ Marks}{No.of\ Students\ attempted\ the\ Question}\right] \times 100$

Final CO ATTAINMENT	CO1	CO2	CO3	CO4	CO5	CO6
PERCENTAGE	59.77	62.95	69.12	58.76	61.25	79.05

CO ATTAINMENT	%	LEVEL
CO1	59.8	2
CO2	63.0	2
CO3	69.1	2
CO4	58.8	2
CO5	61.25	2
CO6	79.05	3

Calculation of CO_n attainment will be average of respective CO_n attainments

TARGET PERCENTAGE	67	TARGET= AVERAGE MARKS. %

OVERALL INTERNAL EXAM CO ATTAINMENT				OVERALL DIRECT CO ATTAINMENT(70% E.A+30% I.A)		
CO ATTAINMENT	%	LEVEL		CO ATTAINMENT	%	LEVEL
CO1	95.7	3		CO1	70.6	3
CO2	99.7	3		CO2	74.0	3
CO3	88.3	3		CO3	74.9	3
CO4	91.2	3		CO4	68.5	2
CO5	92.2	3		CO5	70.5	3
CO6	86.5	3		CO6	81.3	3
Average of Internal Exam Attainment	92.3	3		Average of CO Attainment	73.3	3
OVERALL END EXAM CO ATTAINMENT						
CO ATTAINMENT	%	LEVEL				
CO1	59.8	2				
CO2	63.0	2				
CO3	69.1	2				
CO4	58.8	2				
CO5	61.3	2				
CO6	79.1	3				
Average of End Exam Attainment	65.1	2				

Overall Direct CO Attainment =

70% of Semester End Exam CO Attainment + 30% of Internal Exam CO Attainment

INDIRECT ASSESSMENT

COURSE END SURVEY

		COURSE END SURVEY					
S.No	HT No.	CO1	CO2	CO3	CO4	CO5	CO6
1	20RH1A0401	3	3	3	3	3	3
2	20RH1A0402	3	3	3	3	3	3
3	20RH1A0403	3	3	3	3	3	3
4	20RH1A0404	3	3	3	3	3	3
5	20RH1A0405	3	3	3	3	3	3
6	20RH1A0406	3	3	3	3	3	3
7	20RH1A0407	3	3	3	3	3	3
8	20RH1A0408	3	3	3	3	3	3
9	20RH1A0409	3	3	3	3	3	3
10	20RH1A0410	3	3	3	3	3	3
11	20RH1A0411	3	3	3	3	3	3
12	20RH1A0412	3	3	3	3	3	3
13	20RH1A0413	3	3	3	3	3	3
14	20RH1A0414	3	3	3	3	3	3
15	20RH1A0415	3	3	3	3	3	3
16	20RH1A0416	3	3	3	3	3	3
17	20RH1A0417	3	3	3	3	3	3
18	20RH1A0418	3	3	3	3	3	3
19	20RH1A0419	3	3	3	3	3	3
20	20RH1A0420	3	3	3	3	3	3
21	20RH1A0421	3	3	3	3	3	3
22	20RH1A0422	3	3	3	3	3	3
23	20RH1A0423	3	3	3	3	3	3
24	20RH1A0424	3	3	3	3	3	3
25	20RH1A0425	3	3	3	3	3	3
26	20RH1A0426	3	3	3	3	3	3
27	20RH1A0427	3	3	3	3	3	3
28	20RH1A0428	3	3	3	3	3	3
29	20RH1A0429	3	3	3	3	3	3
30	20RH1A0430	3	3	3	3	3	3
31	20RH1A0431	3	3	3	3	3	3
32	20RH1A0432	3	3	3	3	3	3
33	20RH1A0433	3	3	3	3	3	3
34	20RH1A0434	3	3	3	3	3	3
35	20RH1A0435	3	3	2	2	3	3
36	20RH1A0436	3	3	3	3	3	3
37	20RH1A0437	3	3	3	3	3	3
38	20RH1A0438	3	3	3	3	3	3
39	20RH1A0439	2	3	2	3	3	3
40	20RH1A0440	3	3	3	3	3	3
41	20RH1A0441	3	3	3	3	3	3
42	20RH1A0442	3	3	3	3	3	3
43	20RH1A0443	2	2	3	3	3	2
44	20RH1A0444	3	3	3	3	3	3
45	20RH1A0445	3	3	3	3	3	3
46	20RH1A0446	3	3	3	3	3	3
47	20RH1A0447	3	3	3	2	2	3

48	20RH1A0448	3	3	3	3	3	3
49	20RH1A0449	3	2	2	3	3	2
50	20RH1A0450	3	3	3	3	3	3
51	20RH1A0451	3	3	2	3	3	3
52	20RH1A0452	3	2	3	3	3	2
53	20RH1A0453	3	3	2	3	3	3
54	20RH1A0454	3	3	3	3	3	3
55	20RH1A0455	3	3	3	3	3	3
56	20RH1A0456	3	3	3	3	3	3
57	20RH1A0457	3	3	3	3	3	3
58	20RH1A0458	3	3	3	3	3	3
59	20RH1A0459	3	3	3	2	3	3
60	20RH1A0460	3	3	3	3	3	3
	Target Level	**2.9**	**2.9**	**2.9**	**2.9**	**2.9**	**2.9**
	No. of Students given Target Level of Feedback	**58**	**57**	**55**	**57**	**59**	**57**
	% of Students given Target Level of Feedback	**96.67**	**95**	**91.67**	**95**	**98.33**	**95**
	CO wise Attainment Level	**3**	**3**	**3**	**3**	**3**	**3**
	CO MAPPING	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**

Attainment Level:
3 for (>=70% and <=100%), 2 for (<70% and >=50%), 1 for (<50% and >0%)

DIRECT CO ATTAINMENT(70% E.A+30% I.A)		
CO ATTAINMENT	**%**	**LEVEL**
CO1	**70.55**	**3**
CO2	**73.98**	**3**
CO3	**74.86**	**3**
CO4	**68.50**	**2**
CO5	**70.53**	**3**
CO6	**81.27**	**3**
Average of Direct CO Attainment	**73.28**	**2.83**

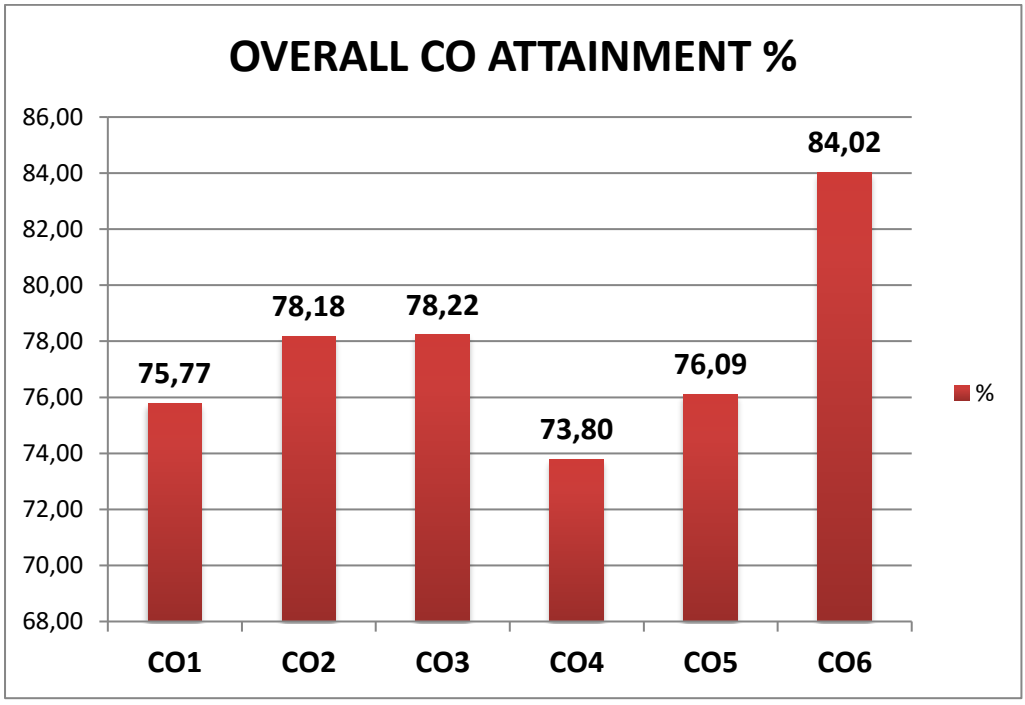
INDIRECT CO ATTAINMENT		
CO ATTAINMENT	**%**	**LEVEL**
CO1	**96.67**	**3**
CO2	**95**	**3**
CO3	**91.67**	**3**
CO4	**95**	**3**
CO5	**98.33**	**3**
CO6	**95**	**3**
Average of Indirect CO Attainment	**95.28**	**3.00**

		TARGET	75
OVERALL CO ATTAINMENT(80% D.A+ 20% I.A)			OBSERVATION
CO ATTAINMENT	%	LEVEL	
CO1	75.77	2.27	TARGET REACHED
CO2	78.18	2.35	TARGET REACHED
CO3	78.22	2.35	TARGET REACHED
CO4	73.80	2.21	TARGET NOT REACHED
CO5	76.09	2.28	TARGET REACHED
CO6	84.02	2.52	TARGET REACHED
Average of CO Attainment	77.68	2.33	

Target for Overall CO Attainment = Internal Exam Target + Semester End Exam Target Value

Overall CO Attainment = 80% of Direct Attainment + 20% of Indirect Attainment

Attainment Level = CO Attainment Percentage X Maximum Attainment Level (3)



Corrective Actions of the course Signals & Systems:

In view of continuously improve Quality, the corrective actions for a sample course:

Course outcome		Attainment Percentage			Observation
		Direct	Indirect	Overall	
CO1	Classify various signal types (e.g., continuous, discrete) and perform fundamental operations to interpret and manipulate signal characteristics.	**70.55**	**96.67**	**75.77**	**Target Reached**
CO2	Analyze signals using orthogonal functions and vector spaces, and demonstrate Fourier series and transform applications for both periodic and non-periodic signals.	**73.98**	**95**	**78.18**	**Target Reached**
CO3	Apply the Fourier Transform to transition between time and frequency domains, Evaluate signal properties such as bandwidth, sampling, aliasing, and reconstruction.	**74.86**	**91.67**	**78.22**	**Target Reached**
CO4	Examine signal behavior through linear time-invariant (LTI) systems, assessing conditions for distortion less transmission and understanding filter characteristics.	**68.50**	**95**	**73.80**	**Target Not Reached**
CO5	Utilize the Laplace Transform for complex signal analysis and relate it to the Fourier Transform in solving real-world signal processing problems.	**70.53**	**98.33**	**76.09**	**Target Reached**
CO6	Interpret discrete-time systems through Z-transforms, compare it with other transforms, and apply it to practical discrete-time signal problems.	**81.27**	**95**	**84.02**	**Target Reached**
Average Value				**77.68**	**Target Reached**

All Course outcomes are NOT Attained.

CO4: Corrective actions are to solve more no. of examples on LTI System Characteristics which include calculation of convolution and system responses

	COURSE CO-PO-PSO ARTICULATION MATRIX														
Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2									3	3	
CO2	3	3	2	2									3	3	
CO3	3	3	3	2									3		
CO4	3	3	3	3									3		
CO5	3	3	3	2									3	3	
CO6	3	3	3	2									3		
	3	3	2.6667	2.1667									3		

		COURSE CO-PO-PSO ATTAINMENT MATRIX														
Course Outcome	FINAL CO ATTAINEMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2.27	2.27	2.27	1.52	1.52									2.27	2.27	
CO2	2.35	2.35	2.35	1.56	1.56									2.35	2.35	
CO3	2.35	2.35	2.35	2.35	1.56									2.35		
CO4	2.21	2.21	2.21	2.21	2.21									2.21		
CO5	2.28	2.28	2.28	2.28	1.52									2.28	2.28	
CO6	2.52	2.52	2.52	2.52	1.68									2.52		
	AVERAGE	2.33	2.33	2.074	1.677									2.33	2.3	

PO_n Attainment Calculation = $\left[\frac{Final\ CO\ Attainment\ Level}{Maximum\ Attainment\ Level\ (3)}\right]$ X CO_n – PO_n Mapping Value

PSO_n Attainment Calculation = $\left[\frac{Final\ CO\ Attainment\ Level}{Maximum\ Attainment\ Level\ (3)}\right]$ X CO_n – PSO_n Mapping Value

13. RECORD OF CO, PO & PSO EVALUATION

Attainment Levels of Course Outcomes for the 2020 Admitted batch of students

C.No	Course Code	Course Name	CO	CO Attainment %			Attainment Level
				Direct	Indirect	Over all	
C101	**2000HS01**	English	CO1	77.55	97.91	81.62	2.45
			CO2	75.81	88.70	78.39	2.35
			CO3	72.75	89.12	76.03	2.28
			CO4	50.36	97.91	59.87	1.80
			CO5	67.58	86.61	71.38	2.14
			CO6	79.40	99.16	83.35	2.50
C102	**2000BS06**	Engineering Chemistry	CO1	88.33	98.33	90.33	2.71
			CO2	76.70	90.79	79.52	2.39
			CO3	68.14	89.96	72.51	2.18
			CO4	80.21	89.54	82.07	2.46
			CO5	81.89	93.72	84.25	2.53
			CO6	80.75	94.14	83.43	2.50
C103	**2002ES01**	Basic Electrical Engineering	CO1	80.59	95.82	83.64	2.51
			CO2	74.27	86.61	76.74	2.30
			CO3	83.83	85.77	84.22	2.53
			CO4	84.34	94.98	86.47	2.59
			CO5	85.95	87.03	86.16	2.58
			CO6	85.97	85.36	85.85	2.58
C104	**2003ES61**	Engineering Workshop	CO1	94.19	95.40	94.44	2.83
			CO2	94.19	94.14	94.18	2.83
			CO3	94.19	87.45	92.85	2.79
			CO4	94.19	88.70	93.10	2.79
			CO5	94.19	93.72	94.10	2.82
			CO6	94.19	83.68	92.09	2.76
C105	**2000HS61**	English Language and Communication Skills Lab	CO1	98.90	95.40	98.20	2.95
			CO2	98.90	94.14	97.95	2.94
			CO3	98.90	87.45	96.61	2.90
			CO4	98.90	88.70	96.86	2.91
			CO5	98.90	93.72	97.86	2.94
			CO6	98.90	83.68	95.86	2.88
C106	**2000BS62**	Engineering Chemistry Lab	CO1	95.54	95.82	95.60	2.87
			CO2	95.54	96.23	95.68	2.87
			CO3	95.54	93.31	95.10	2.85

			CO4	95.54	90.79	94.59	2.84
			CO5	95.54	94.98	95.43	2.86
			CO6	95.54	94.56	95.35	2.86
C107	**2002ES61**	Basic Electrical Engineering Lab	CO1	99.56	96.65	98.98	2.97
			CO2	99.56	96.23	98.89	2.97
			CO3	99.56	94.14	98.48	2.95
			CO4	99.56	91.63	97.97	2.94
			CO5	99.56	94.98	98.64	2.96
			CO6	99.56	95.40	98.73	2.96
C108	**2000BS01**	Mathematics – I	CO1	88.23	98.33	90.25	2.71
			CO2	74.13	87.03	76.71	2.30
			CO3	69.30	87.03	72.85	2.19
			CO4	69.42	88.28	73.19	2.20
			CO5	66.35	93.31	71.74	2.15
			CO6	69.77	88.28	73.47	2.20
C109	**2000BS05**	Applied Physics	CO1	62.41	95.82	69.09	2.07
			CO2	69.82	93.72	74.60	2.24
			CO3	86.90	96.23	88.76	2.66
			CO4	82.14	97.49	85.21	2.56
			CO5	73.01	94.56	77.32	2.32
			CO6	61.60	94.56	68.19	2.05
C110	**2005ES01**	Programming for Problem Solving	CO1	90.57	100.00	92.46	2.77
			CO2	82.63	94.98	85.10	2.55
			CO3	70.43	94.56	75.25	2.26
			CO4	71.31	93.72	75.79	2.27
			CO5	74.63	95.82	78.87	2.37
			CO6	58.07	96.23	65.70	1.97
C111	**2003ES01**	Engineering Drawing	CO1	99.55	98.33	99.31	2.98
			CO2	99.64	86.61	97.03	2.91
			CO3	99.43	86.19	96.78	2.90
			CO4	99.57	87.03	97.06	2.91
			CO5	98.43	92.89	97.33	2.92
			CO6	99.89	92.89	98.49	2.95
C112	**2000BS61**	Applied Physics Lab	CO1	96.41	98.74	96.88	2.91
			CO2	96.41	97.07	96.54	2.90
			CO3	96.41	98.74	96.88	2.91
			CO4	96.41	92.89	95.71	2.87
			CO5	96.41	97.07	96.54	2.90
			CO6	96.41	99.16	96.96	2.91
C113	**2005ES61**	Programming for Problem Solving Lab	CO1	98.07	98.74	98.21	2.95
			CO2	98.07	97.07	97.87	2.94

			CO3	98.07	98.74	98.21	2.95
			CO4	98.07	92.89	97.04	2.91
			CO5	98.07	97.07	97.87	2.94
			CO6	98.07	99.16	98.29	2.95
C114	**2000BS02**	Mathematics – II	CO1	64.49	98.33	71.26	2.14
			CO2	79.52	86.61	80.94	2.43
			CO3	78.99	86.19	80.43	2.41
			CO4	68.36	87.03	72.09	2.16
			CO5	82.50	90.79	84.16	2.52
			CO6	66.11	86.61	70.21	2.11
C201	**2000BS03**	Mathematics-III	CO1	75.43	99.23	80.19	2.41
			CO2	71.27	95.77	76.17	2.29
			CO3	75.27	96.15	79.44	2.38
			CO4	74.61	92.31	78.15	2.34
			CO5	75.25	96.54	79.50	2.39
			CO6	58.34	95.77	65.82	1.97
C202	**2004PC01**	Electronic Devices & Circuits	CO1	71.81	99.62	77.37	2.32
			CO2	75.84	96.15	79.90	2.40
			CO3	75.69	95.77	79.70	2.39
			CO4	76.94	99.62	81.47	2.44
			CO5	49.19	96.15	58.58	1.76
			CO6	75.17	95.77	79.29	2.38
C203	**2004PC02**	Signals & Systems	CO1	83.24	98.46	86.28	2.59
			CO2	82.69	91.15	84.38	2.53
			CO3	80.80	89.23	82.49	2.47
			CO4	75.44	86.54	77.66	2.33
			CO5	89.54	94.23	90.48	2.71
			CO6	77.94	91.15	80.58	2.42
C204	**2004PC03**	Network Analysis	CO1	82.48	98.46	85.68	2.57
			CO2	82.65	95.38	85.20	2.56
			CO3	79.47	94.62	82.50	2.48
			CO4	82.70	94.62	85.08	2.55
			CO5	83.19	96.92	85.94	2.58
			CO6	70.07	95.38	75.13	2.25
C205	**2005ES02**	Python Programming	CO1	96.43	96.15	96.37	2.89
			CO2	91.31	88.46	90.74	2.72
			CO3	96.68	82.31	93.80	2.81
			CO4	94.36	94.62	94.41	2.83
			CO5	95.99	88.46	94.48	2.83
			CO6	89.19	82.31	87.81	2.63
C206	**2004PC61**	Electronic Devices & Circuits Lab	CO1	95.06	98.85	95.82	2.87
			CO2	95.06	97.31	95.51	2.87
			CO3	95.06	98.85	95.82	2.87

			CO4	95.06	94.23	94.89	2.85
			CO5	95.06	97.31	95.51	2.87
			CO6	95.06	99.23	95.89	2.88
C207	**2004PC62**	Basic Simulation Lab	CO1	94.18	98.85	95.12	2.85
			CO2	94.18	97.31	94.81	2.84
			CO3	94.18	98.85	95.12	2.85
			CO4	94.18	94.23	94.19	2.83
			CO5	94.18	97.31	94.81	2.84
			CO6	94.18	99.23	95.19	2.86
C208	**2005ES02**	Computer Organization & Operating Systems	CO1	88.22	100.00	90.58	2.72
			CO2	87.51	99.22	89.85	2.70
			CO3	90.75	99.22	92.45	2.77
			CO4	86.81	91.05	87.66	2.63
			CO5	88.05	98.44	90.13	2.70
			CO6	84.34	98.44	87.16	2.61
C209	**2005OE01**	Data Structures using Python	CO1	85.47	96.11	87.60	2.63
			CO2	87.99	88.33	88.06	2.64
			CO3	91.39	87.16	90.55	2.72
			CO4	86.27	97.67	88.55	2.66
			CO5	86.71	88.33	87.04	2.61
			CO6	86.82	87.16	86.89	2.61
C210	**2004PC04**	Analog Circuits	CO1	84.64	99.61	87.63	2.63
			CO2	82.32	94.16	84.69	2.54
			CO3	85.61	93.77	87.24	2.62
			CO4	72.41	99.22	77.77	2.33
			CO5	89.25	94.16	90.24	2.71
			CO6	86.69	93.77	88.10	2.64
C211	**2004PC05**	Analog and Digital Communications	CO1	77.27	97.67	81.35	2.44
			CO2	67.08	95.33	72.73	2.18
			CO3	79.59	94.94	82.66	2.48
			CO4	89.20	86.38	88.64	2.66
			CO5	91.52	95.72	92.36	2.77
			CO6	92.17	94.16	92.57	2.78
C212	**2004PC06**	Control Systems	CO1	83.83	99.61	86.99	2.61
			CO2	84.00	94.55	86.11	2.58
			CO3	75.00	94.16	78.83	2.37
			CO4	81.53	99.22	85.07	2.55
			CO5	77.50	99.61	81.92	2.46
			CO6	77.89	94.55	81.22	2.44
C213	**2004PC07**	Probability Theory & Stochastic Process	CO1	88.23	96.11	89.80	2.69
			CO2	82.87	94.55	85.20	2.56

			CO3	80.02	94.55	82.93	2.49
			CO4	83.97	85.99	84.37	2.53
			CO5	85.47	96.11	87.60	2.63
			CO6	82.31	96.11	85.07	2.55
C214	**2004PC63**	Analog Circuits Lab	CO1	91.70	98.83	93.13	2.79
			CO2	91.70	97.28	92.82	2.78
			CO3	91.70	98.83	93.13	2.79
			CO4	91.70	94.16	92.19	2.77
			CO5	91.70	97.28	92.82	2.78
			CO6	91.70	99.22	93.21	2.80
C215	**2004PC64**	Analog & Digital Communication Lab	CO1	93.78	98.83	94.79	2.84
			CO2	93.78	95.33	94.09	2.82
			CO3	93.78	96.89	94.40	2.83
			CO4	93.78	90.66	93.16	2.79
			CO5	93.78	95.72	94.17	2.83
			CO6	93.78	99.22	94.87	2.85
C301	**2000HS03**	Managerial Economics & Financial Analysis	CO1	94.55	97.67	95.17	2.86
			CO2	93.13	91.05	92.71	2.78
			CO3	82.02	90.66	83.75	2.51
			CO4	84.80	89.88	85.82	2.57
			CO5	74.77	95.33	78.88	2.37
			CO6	73.29	90.66	76.77	2.30
C302	**200HS02**	Professional English	CO1	82.87	99.22	86.14	2.58
			CO2	81.05	96.11	84.06	2.52
			CO3	85.18	94.94	87.13	2.61
			CO4	81.93	93.00	84.14	2.52
			CO5	79.69	96.50	83.05	2.49
			CO6	75.50	99.22	80.24	2.41
C303	**2004PC08**	Digital System Design	CO1	79.02	99.61	83.14	2.49
			CO2	80.85	94.16	83.51	2.51
			CO3	83.94	93.77	85.90	2.58
			CO4	91.68	99.22	93.18	2.80
			CO5	83.43	94.16	85.58	2.57
			CO6	77.34	93.77	80.63	2.42
C304	**2004PC09**	Electromagnetic Waves	CO1	83.85	98.44	86.77	2.60
			CO2	80.92	96.89	84.11	2.52
			CO3	76.75	96.89	80.77	2.42
			CO4	85.18	87.94	85.73	2.57
			CO5	75.15	96.89	79.50	2.38
			CO6	81.48	96.89	84.56	2.54
C305	**2004PE01**	Mobile Communications	CO1	83.75	99.22	86.84	2.61

			CO2	83.57	96.89	86.23	2.59
			CO3	84.79	95.72	86.98	2.61
			CO4	92.35	94.55	92.79	2.78
			CO5	83.22	97.28	86.03	2.58
			CO6	87.21	96.89	89.14	2.67
C306	**2005OE03**	Java Programming	CO1	79.43	98.44	83.24	2.50
			CO2	67.27	94.16	72.65	2.18
			CO3	83.36	94.16	85.52	2.57
			CO4	79.23	85.60	80.51	2.42
			CO5	85.71	95.72	87.71	2.63
			CO6	82.79	95.72	85.38	2.56
C307	**2004PC65**	Digital System Design Lab	CO1	92.80	98.44	93.93	2.82
			CO2	92.80	94.94	93.23	2.80
			CO3	92.80	97.28	93.69	2.81
			CO4	92.80	93.00	92.84	2.79
			CO5	92.80	95.72	93.38	2.80
			CO6	92.80	99.22	94.08	2.82
C308	**2004PC66**	Electromagnetic Waves Lab	CO1	87.34	98.44	89.56	2.69
			CO2	87.34	94.94	88.86	2.67
			CO3	87.34	97.28	89.33	2.68
			CO4	87.34	93.00	88.47	2.65
			CO5	87.34	95.72	89.02	2.67
			CO6	87.34	99.22	89.72	2.69
C309	**2004PR01**	Innovative Product Development-I	CO1	OVERALL CO ATTAINMENT			3.00
			CO2	OVERALL CO ATTAINMENT			3.00
			CO3	OVERALL CO ATTAINMENT			3.00
			CO4	OVERALL CO ATTAINMENT			3.00
			CO5	OVERALL CO ATTAINMENT			3.00
			CO6	OVERALL CO ATTAINMENT			3.00
C310	**2000HS04**	Management Science	CO1	84.67	98.44	87.43	2.62
			CO2	74.72	90.27	77.83	2.33
			CO3	83.25	89.88	84.58	2.54
			CO4	83.95	82.49	83.66	2.51
			CO5	88.00	94.16	89.23	2.68
			CO6	87.09	94.16	88.51	2.66
C311	**2004PC10**	Digital Signal Processing	CO1	83.08	96.11	85.69	2.57
			CO2	85.70	89.49	86.46	2.59
			CO3	86.76	88.33	87.08	2.61
			CO4	82.58	97.67	85.60	2.57
			CO5	80.10	89.49	81.98	2.46
			CO6	80.37	88.33	81.96	2.46

C312	**2004PC11**	Linear & Digital IC Applications	CO1	81.81	99.22	85.29	2.56
			CO2	84.85	94.94	86.87	2.61
			CO3	71.82	94.16	76.29	2.29
			CO4	87.58	97.67	89.60	2.69
			CO5	78.13	93.77	81.26	2.44
			CO6	72.36	94.94	76.87	2.31
C313	**2004PE04**	Antennas and Wave Propagation	CO1	66.78	98.83	73.19	2.20
			CO2	72.18	97.67	77.28	2.32
			CO3	73.88	97.67	78.64	2.36
			CO4	76.85	96.50	80.78	2.42
			CO5	81.83	99.22	85.31	2.56
			CO6	78.36	99.22	82.53	2.48
C314	**2004PE09**	VLSI Design	CO1	80.66	96.11	83.75	2.51
			CO2	78.59	88.33	80.54	2.42
			CO3	73.89	87.16	76.54	2.30
			CO4	66.97	97.67	73.11	2.19
			CO5	71.96	88.33	75.24	2.26
			CO6	85.45	87.16	85.79	2.57
C315	**2005OE06**	Fundamentals of Database Management Systems	CO1	88.87	96.11	90.32	2.71
			CO2	87.59	88.33	87.74	2.63
			CO3	91.60	87.16	90.71	2.72
			CO4	77.55	96.11	81.26	2.44
			CO5	84.74	88.33	85.46	2.56
			CO6	76.55	87.16	78.67	2.36
C316	**2004PC68**	Linear & Digital IC Applications Lab	CO1	96.23	98.44	96.67	2.90
			CO2	96.23	96.11	96.20	2.89
			CO3	96.23	96.50	96.28	2.89
			CO4	96.23	92.22	95.43	2.86
			CO5	96.23	98.83	96.75	2.90
			CO6	96.23	99.22	96.83	2.90
C317	**2004PC67**	Digital Signal Processing Lab	CO1	96.23	98.44	96.67	2.90
			CO2	96.23	93.00	95.58	2.87
			CO3	96.23	96.50	96.28	2.89
			CO4	96.23	92.22	95.43	2.86
			CO5	96.23	95.33	96.05	2.88
			CO6	96.23	99.22	96.83	2.90
C318	**2004PR02**	Innovative Product Development-II	CO1	OVERALL CO ATTAINMENT			3.00
			CO2	OVERALL CO ATTAINMENT			3.00
			CO3	OVERALL CO ATTAINMENT			3.00

			CO4	OVERALL CO ATTAINMENT			3.00
			CO5	OVERALL CO ATTAINMENT			3.00
			CO6	OVERALL CO ATTAINMENT			3.00
C401	**2004PC12**	Computer Networks	CO1	84.51	99.22	87.46	2.62
			CO2	84.22	96.50	86.68	2.60
			CO3	86.59	95.72	88.41	2.65
			CO4	83.98	93.77	85.94	2.58
			CO5	77.37	96.50	81.20	2.44
			CO6	77.26	96.50	81.11	2.43
C402	**2004PC13**	Microprocessors & Microcontrollers	CO1	92.43	99.22	93.79	2.81
			CO2	94.03	98.44	94.91	2.85
			CO3	77.05	98.05	81.25	2.44
			CO4	93.92	96.89	94.51	2.84
			CO5	89.46	98.44	91.26	2.74
			CO6	92.25	98.44	93.49	2.80
C403	**2004PE10**	Artificial Intelligence and Machine Learning	CO1	85.01	98.44	87.70	2.63
			CO2	80.41	90.66	82.46	2.47
			CO3	85.39	90.27	86.37	2.59
			CO4	89.76	96.11	91.03	2.73
			CO5	86.53	94.16	88.06	2.64
			CO6	80.44	91.05	82.56	2.48
C404	**2005OE07**	Computer Forensics	CO1	90.45	91.83	90.73	2.72
			CO2	91.17	91.83	91.30	2.74
			CO3	90.48	91.44	90.67	2.72
			CO4	94.30	90.66	93.57	2.81
			CO5	88.47	95.33	89.85	2.70
			CO6	88.45	92.22	89.20	2.68
C405	**2004PC69**	Computer Networks Lab	CO1	95.97	98.44	96.47	2.89
			CO2	95.97	92.61	95.30	2.86
			CO3	95.97	94.55	95.69	2.87
			CO4	95.97	90.66	94.91	2.85
			CO5	95.97	97.28	96.23	2.89
			CO6	95.97	97.67	96.31	2.89
C406	**2004PC70**	Microprocessors & Microcontrollers Lab	CO1	95.35	98.05	95.89	2.88
			CO2	95.35	92.22	94.72	2.84
			CO3	95.35	93.77	95.03	2.85
			CO4	95.35	88.72	94.02	2.82
			CO5	95.35	93.39	94.96	2.85
			CO6	95.35	97.28	95.73	2.87
C407	**2004PR03**	Innovative Product Development-III	CO1	OVERALL CO ATTAINMENT			3.00
			CO2	OVERALL CO ATTAINMENT			3.00

			CO3	OVERALL CO ATTAINMENT			3.00
			CO4	OVERALL CO ATTAINMENT			3.00
			CO5	OVERALL CO ATTAINMENT			3.00
			CO6	OVERALL CO ATTAINMENT			3.00
C408	**2004PR04**	Industry Oriented Mini Project/Internship	CO1	OVERALL CO ATTAINMENT			3.00
			CO2	OVERALL CO ATTAINMENT			3.00
			CO3	OVERALL CO ATTAINMENT			3.00
			CO4	OVERALL CO ATTAINMENT			3.00
			CO5	OVERALL CO ATTAINMENT			3.00
			CO6	OVERALL CO ATTAINMENT			3.00
C409	**2004PR05**	Project -I	CO1	OVERALL CO ATTAINMENT			3.00
			CO2	OVERALL CO ATTAINMENT			3.00
			CO3	OVERALL CO ATTAINMENT			3.00
			CO4	OVERALL CO ATTAINMENT			3.00
			CO5	OVERALL CO ATTAINMENT			3.00
			CO6	OVERALL CO ATTAINMENT			3.00
C410	**2004PE15**	CMOS Design	CO1	86.46	97.67	88.71	2.66
			CO2	73.12	89.92	76.48	2.29
			CO3	87.01	90.31	87.67	2.63
			CO4	83.43	88.37	84.42	2.53
			CO5	70.56	93.80	75.21	2.26
			CO6	91.17	92.64	91.47	2.74
C411	**2004PE18**	5G Communications	CO1	75.00	98.45	79.69	2.39
			CO2	74.90	98.45	79.61	2.39
			CO3	85.75	93.41	87.28	2.62
			CO4	84.92	96.90	87.31	2.62
			CO5	77.04	98.45	81.32	2.44
			CO6	72.85	93.41	76.96	2.31
C412	**2004PR06**	Technical Seminar	CO1	OVERALL CO ATTAINMENT			3.00
			CO2	OVERALL CO ATTAINMENT			3.00
			CO3	OVERALL CO ATTAINMENT			3.00
			CO4	OVERALL CO ATTAINMENT			3.00
			CO5	OVERALL CO ATTAINMENT			3.00
			CO6	OVERALL CO ATTAINMENT			3.00
C413	**2004PR07**	Innovation Start-Up & Entrepreneurship	CO1	OVERALL CO ATTAINMENT			3.00
			CO2	OVERALL CO ATTAINMENT			3.00
			CO3	OVERALL CO ATTAINMENT			3.00
			CO4	OVERALL CO ATTAINMENT			3.00
			CO5	OVERALL CO ATTAINMENT			3.00
			CO6	OVERALL CO ATTAINMENT			3.00
C414	**2004PR08**	Project - II	CO1	OVERALL CO ATTAINMENT			3.00
			CO2	OVERALL CO ATTAINMENT			3.00
			CO3	OVERALL CO ATTAINMENT			3.00

			CO4	OVERALL CO ATTAINMENT	3.00
			CO5	OVERALL CO ATTAINMENT	3.00
			CO6	OVERALL CO ATTAINMENT	3.00

Direct - PO Attainment

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C101						1.52		1.52		1.92		2.13
C102	1.68	1.95	1.74		1.59	1.63	1.59					
C103	2.52	2.38	2.52									
C104	3.00	3.00		2.00				3.00	3.00		3.00	
C105						1.93		1.93		2.52		2.92
C106	2.06	1.91		1.91								
C107	2.96	2.79	2.96		1.97				1.97			
C108	2.28	2.28										
C109	2.32	2.61	2.36	1.54								1.54
C110	1.77	1.64	1.68		1.70					1.51		
C111	2.93	2.93		2.60	2.77						2.28	2.61
C112	2.90			2.90					2.90			1.93
C113	2.93	2.94	2.45	1.96	1.96				2.95			
C114	2.37											
C201	2.30	2.30										
C202	2.28	2.15	1.92	1.75	1.63					2.28		
C203	2.51	2.51	2.22	1.80								
C204	2.55	2.55	2.55	2.55	2.55							
C205	2.79	2.79	2.79	2.48	1.70							
C206	2.87	2.87	2.71	2.87	2.87							
C207	2.85	2.85	2.37	2.84	2.85							
C208	2.24	2.23	2.32	2.40								
C209	1.77	1.63	1.33	1.63								
C210	2.58	2.58	2.14	2.06	1.72							
C211	2.55	2.55	2.67	2.52								
C212	2.50	1.81	1.83	2.50								
C213	2.59	2.59	2.59	1.71								
C214	2.79	2.79	2.79									
C215	2.83	2.83	2.82	2.83								
C301		1.94		1.72		2.35	2.43	2.44	1.64	1.59	2.44	2.51
C302						1.74		1.74		2.36		2.52
C303	2.58	2.58	2.45	1.74	2.60							
C304	2.37	2.37	2.37	2.11	2.10							
C305	2.64	1.76	1.76									
C306	1.65	2.48	2.48	2.08	2.48							

C307	2.34	1.88	2.80	1.87	2.50							
C308	2.67	2.38	2.68	2.38	2.39							
C309	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
C310						1.67	1.69		1.71		2.56	1.65
C311	2.54	2.54	2.54	2.27	2.54							
C312	2.48	2.48	2.48									
C313	2.40	2.40	2.40									
C314	2.37	2.11	1.83	1.58	1.61							
C315	2.57	2.18	1.70	2.18	2.72							
C316	2.73		2.89	2.89					2.89			
C317	2.88	2.56	2.41	2.88	2.41							
C318	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
C401	2.55	2.30	1.87	2.10								
C402	2.75	1.88	1.78									
C403	2.59	2.44	2.45	2.27								
C404	2.73	2.19	1.82	2.49								
C405	2.87	2.87	2.24	2.49	2.89							
C406	2.85	2.22	1.88								2.85	2.22
C407	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
C408	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
C409	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
C410	2.52	2.52	2.52	2.49	1.97							
C411	2.46	2.11	1.82	2.08								
C412	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
C413	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
C414	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Avg.	2.59	2.48	2.41	2.37	2.45	2.49	2.70	2.66	2.74	2.58	2.86	2.59

Indirect - PO Attainment

Indirect Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Graduate Exit Survey(S1)	2.88	2.90	2.90	2.83	2.77	2.96	2.93	2.90	2.85	2.86	2.91	2.95
Alumni Survey(S2)	2.79	2.74	2.86	2.73	2.71	2.85	2.85	2.86	2.89	2.76	2.76	2.83
Employer Survey(S3)	2.87	2.76	2.76	2.73	2.76	2.78	2.51	2.62	2.60	2.71	2.73	2.76
Overall Indirect Attainment(AVG.)	2.84	2.80	2.84	2.76	2.75	2.86	2.76	2.79	2.78	2.78	2.80	2.84

Overall PO Attainment

Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Direct Attainment(D.A)	2.59	2.48	2.41	2.37	2.45	2.49	2.70	2.66	2.74	2.58	2.86	2.59
Indirect Attainment(I.A)	2.84	2.80	2.84	2.76	2.75	2.86	2.76	2.79	2.78	2.78	2.80	2.84
Overall Attainment(80% of D.A + 20% of I.A)	**2.64**	**2.54**	**2.49**	**2.45**	**2.51**	**2.56**	**2.71**	**2.69**	**2.75**	**2.62**	**2.85**	**2.64**

Direct - PSO Attainment

Course	PSO1	PSO2	PSO3
C101			1.86
C102	0.81		
C103	2.52		
C104		3.00	
C105	1.94	1.95	2.26
C106	1.91		
C107	2.96		
C108	2.28		
C109	2.20		
C110	1.66	1.56	
C111		1.95	
C112	2.74		
C113	1.96		1.96
C114	2.37		
C201	2.30		
C202	1.39	1.26	
C203	2.51		
C204	1.70	1.70	
C205	1.86	2.79	
C206	2.87	2.71	
C207	2.85	2.53	
C208	1.79		
C209	1.77	1.77	
C210	2.58		
C211	2.55		
C212	2.50		
C213	2.01		
C214	2.79		
C215	2.83		
C301	2.12	2.58	2.58
C302	1.69	1.67	2.11
C303	2.58		

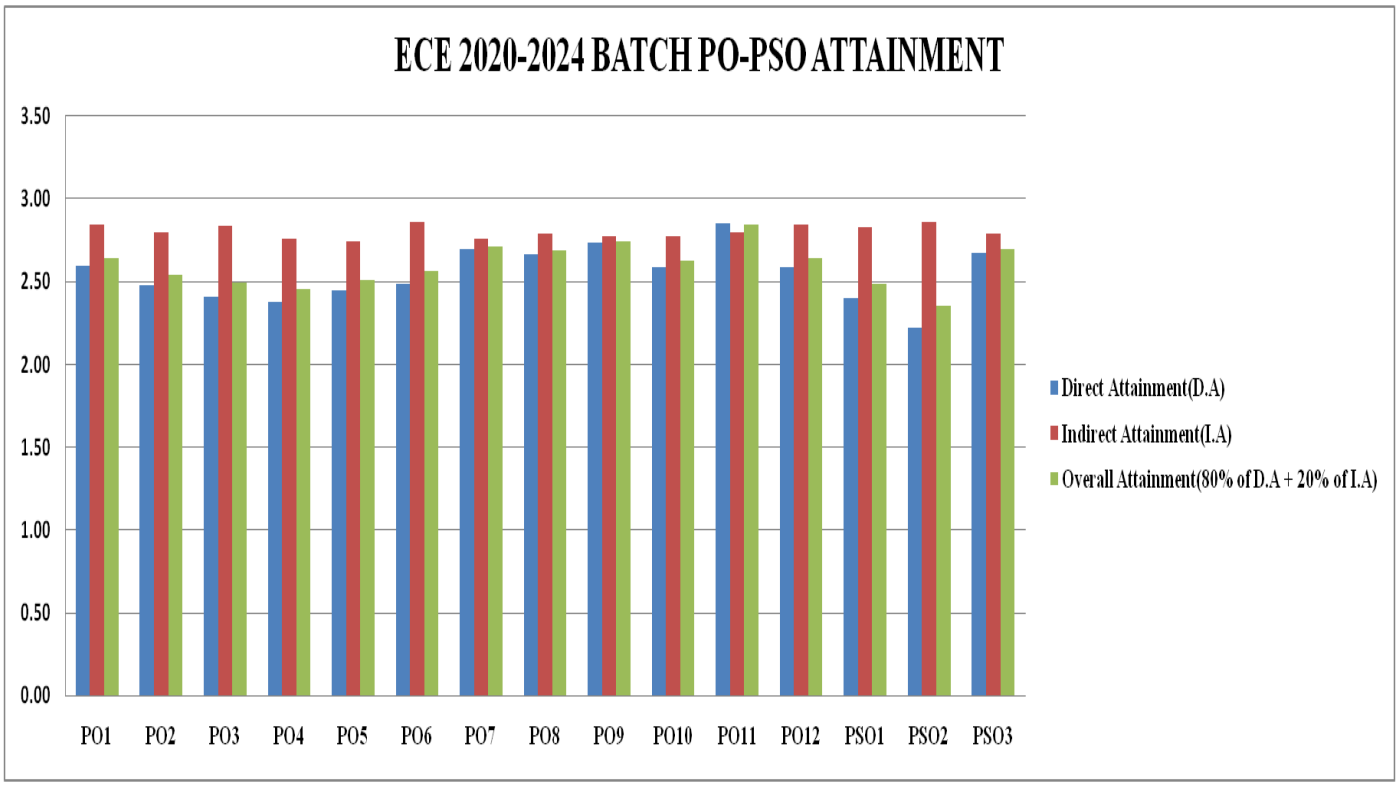
C304	2.51		
C305	2.64		
C306	1.65	1.65	
C307	2.81		
C308	2.67		
C309	3.00	3.00	3.00
C310	1.71	2.56	
C311	2.54	1.68	
C312	2.48		
C313	2.40	1.81	
C314	2.37	1.56	
C315	2.42	1.72	
C316	2.89		
C317	2.88	1.92	
C318	3.00	3.00	3.00
C401	2.55	1.70	
C402	2.75	2.20	
C403	2.45	2.16	
C404	1.82	1.82	
C405	2.87	1.92	
C406	1.90	2.36	
C407	3.00	3.00	3.00
C408	3.00	3.00	3.00
C409	3.00	3.00	3.00
C410	2.52	1.68	
C411	2.46	1.65	
C412	3.00	3.00	3.00
C413	3.00	3.00	3.00
C414	3.00	3.00	3.00
	2.40	2.22	2.67

Indirect - PSO Attainment

Indirect Attainment	PSO1	PSO2	PSO3
Graduate Exit Survey(S1)	2.83	2.82	2.82
Alumni Survey(S2)	2.85	2.76	2.84
Employer Survey(S3)	2.80	2.62	2.71
Overall Indirect Attainment(AVG.)	2.83	2.86	2.79

Overall PSO Attainment

Attainment	PSO1	PSO2	PSO3
Direct Attainment(D.A)	2.40	2.22	2.67
Indirect Attainment(I.A)	2.83	2.76	2.80
Overall Attainment(80% of D.A + 20% of I.A)	2.49	2.35	2.70


ECE 2020-2024 BATCH PO-PSO ATTAINMENT
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
PO1
PO2
PO3
PO4
PO5
PO6
PO7
PO8
PO9
PO10
PO11
PO12
PSO1
PSO2
PSO3
Direct Attainment(D.A)
Indirect Attainment(I.A)
Overall Attainment(80% of D.A + 20% of I.A)