

**JCT** College of Engineering and Technology (AUTONOMOUS)



Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai & Accredited by NAAC 'A' Grade Accredited by NBA for Petrochemical, Mechanical, EEE & CSE Pichanur, Coimbatore - 641105 | info@jct.ac.in | www.jct.ac.in | 0422 2636900

# A HANDBOOK ON OUTCOME BASED EDUCATION





RINCIPAL JCT College of Engineering & Technology 44 404

# INDEX

SI No	Торіс
1	Preamble
2	About the Institution
3	Institute Vision, Mission and Quality Policy
4	Outcome based education(OBE)Overview
5	OBE Frame work of Institution
	a. Process to define Vision , Mission and PEO's
	b. Bloom's Taxonomy and Action Verbs for Course Outcomes
	c. POs, PSOs and COs
	d.CO-PO mapping
	e.CO-PO Assessment
6	Measures for Continuous Improvement

#### **1. PREAMBLE**

Outcome-Based Education (OBE) serves as a transformative approach that shifts the focus from traditional methods of instruction to a more learner-centered paradigm. The primary objective of OBE is to ensure that students not only acquire knowledge but also demonstrate the skills, competencies, and attitudes essential for success in their professional and personal lives.

OBE is grounded in the belief that all learners can achieve desired outcomes if provided with clear expectations, appropriate learning experiences, and constructive feedback. It emphasizes setting specific, measurable learning outcomes that are aligned with real-world requirements and challenges. By clearly defining the intended outcomes, OBE fosters a more meaningful and purposeful learning process, equipping students with the ability to apply what they have learned in diverse and dynamic environments.

Through a structured yet flexible framework, OBE promotes continuous improvement in teaching, learning, and assessment practices. Educators are encouraged to create innovative strategies and learning environments that support students in achieving the desired outcomes. At the same time, students are empowered to take an active role in their learning journey, ensuring that they are not merely passive recipients of information but active participants in their education.

By focusing on outcomes, OBE aligns educational goals with the demands of society, industry, and the global landscape. This ensures that graduates are wellprepared to contribute meaningfully to their communities, adapt to change, and thrive in an increasingly complex world. The implementation of OBE underscores our commitment to fostering lifelong learners who are capable, confident, and ready to meet the challenges of the future.

# **2. ABOUT THE INSTITUTION**

Shri Jagannath Educational Health and Charitable Trust was established by renowned and philanthropic people with an objective of providing education to all especially the down trodden and rural population.

Considering the growing demands for technical education in the country the trust has started an engineering college namely JCT College of Engineering and Technology in Pichanur, Coimbatore for the academic year 2009-2010.

The Management strives hard to enhance the professional knowledge, skills and attitudes of educators, so that they might in turn improve the learning process of students. The college aims at developing a deep understanding of the human values and social concerns among the engineering graduates

Students will be encouraged to get equipped and sensitized to understand full implications of their decisions, actions and ever inactions. Above all the college will promote Technical Education to meet the requirements of a developing nation in the context of global concern at the threshold of the twenty-first century.

A team of educated, enlightened, experienced technocrats with vision, firmly determined to promote high quality of education will strive to provide every facility for achieving excellence.

# **3. INSTITUTE VISION, MISSION& QUALITY POLICY**

# Vision:

To emerge as a Premier Institute for developing industry ready engineers with competency, initiative and character to meet the challenges in global environment.

# Mission:

•To impart state-of-the-art engineering and professional education through strong theoretical basics and hands on training to students in their choice of field.

•To serve our students by teaching them leadership, entrepreneurship, teamwork, values, quality, ethics and respect for others.

•To provide opportunities for long-term interaction with academia and industry.

•To create new knowledge through innovation and research.

# **Quality Policy**

- To create quality professionals to meet the emerging Industrial, Social and Economical needs.
- To create a good ambiance to the Students for their Academic Excellence and Innovation.
- Enhancing the skills and Knowledge of the Faculty and Staff through career development programmes.
- Encouraging and fostering a spirit of teamwork.
- Aiming at continual Improvement in all our activities.
- The management supports the team of educators to improve their professional knowledge through career development programmes, which enhance them to bring out graduates with social values.
- Students are motivated to take up decisions and they are continuously updated with technical knowledge that is essential for a developing nation.
- Helps the students for career development by improving their communication skills and technical knowledge.

# 4. OUTCOME BASED EDUCATION (OBE) OVERVIEW

#### Overview

The outcome based education (OBE) is an educational approach that serves as the cornerstone of a high-quality educational system. It employs multiple styles of teaching and assessment as part of the instructional processes. All educational activities carried out in OBE help the students to achieve the set goals. Based on the desired goals, the faculty may change their function as a teacher, trainer, facilitator, and/or mentor. The main idea driving this strategy is that by the end of the educational process, every student should have accomplished the objective. OBE builds on conventional approaches and offers precise guidelines for measurable and observable outcomes.

#### **Benefits Of OBE**

•**Clarity:** The focus on outcome creates a clear expectation of what needs to be accomplished by the end of the course.

•Flexibility: With a clear sense of what needs to be accomplished, teachers will be able to structure their courses around the specific outcomes.

•**Comparison:** there is scope to make comparison across individual, class, programme and institute levels.

•**Involvement:** Students are involved in active learning.

Thus OBE is a learner-centric approach to education that focuses on what a student should be able to do by aligning the different levels of Benjamin Bloom's taxonomy by achieving observable and measurable learning outcomes. Learning outcomes are statements of the primary skills, knowledge, attitudes, abilities and proficiencies the learner will "own" at the end of the course. The key to success in outcome based education is clarity, for both teachers and students to understand what's expected of them. In addition to understanding what's expected, outcome based education also encourages transparency. The basic principle of outcome based education is that students must meet a specific standard to graduate. OBE is a

student- centric learning model that helps teachers to plan the course delivery and assessment as follows:

- OBL-Outcome Based Learning
- OBT-Outcome Based Teaching
- OBA-Outcome Based Assessment



FIG 4.1: Overview of Outcome Based Education

In OBE, the curriculum is carefully constructed by first determining the outcomes, and then designed backwards by:

- Carefully determining authentic assessments (how will we know?)
- Choosing/building relevant learning activities and experiences.
- Selecting appropriate content.

# **Unique Features of OBE**

- OBE enhances the communications among various stakeholders.
- OBE helps in examining the vision and mission of the institution.
- OBE evaluates student's performance effectively.
- OBE helps in mapping the course outcomes and Programme Outcomes for each assessment.

#### **Core elements of OBE**

**Course:** Course is defined as a theory, practical or theory cum practical subject studied in a semester. For E.g. Mathematics

**Programme :** Programme is defined as the specialization or discipline of a Degree. It is the interconnected arrangement of courses, co-curricular and extracurricular activities to

accomplishpredeterminedobjectivesleadingtotheawardingofadegree.ForExample:B.E. Electronics and Communication Engineering

**Assessment:** Assessment is one or more processes carried out by the institution that identifies, collect, and prepare data to evaluate the achievement of Programme Educational Objectives and programme outcomes.

**Attainment :** Attainment is the action or fact of achieving a standard result towards the accomplishment of desired goals. Primarily attainment is the standard of academic attainment as observed by test or examination result.

**Graduate Attributes (GA):** The graduate attributes are exemplars of the attributes expected of a graduate from an accredited programme.

**Programme Educational Objectives (PEOs):** The Programme Educational Objectives of the statements that describe the expected achievements of graduates in their career, and also in particular, what the graduates are expected to perform and achieve during the first few years after graduation.

**Programme Outcomes (POs):** Programme Outcomes are narrower statements that describewhatstudentsareexpectedtobeabletodobythetimeofgraduation.POsare expected to be aligned closely with Graduate Attributes.

**Programme Specific Outcomes(PSOs):** Programme Specific Outcomes are what the students should be able to do at the time of graduation with reference to a specific discipline. Usually there are two to four PSOs for a programme.

**Course Outcomes (COs):** Course outcomes are statements that describe significant and essential learning that learners have achieved, and can be reliably demonstrated at theendofacourse.Generallythreeormorecourseoutcomesmaybespecifiedforeach course based on its weightage.



FIG4.2: Process involved in outcome based Education

Outcome Based Education (OBE) starts with a clear statement on Knowledge, Skills, and Attitudes that the Graduates will be able to demonstrate. These are stated as Programme Outcomes and Course Outcomes and are related with the Vision, Mission and PEO statements and GA as stated in Washington Accord.

The OBE process involves the following steps:

- 1. Statement of measurable PEOs, PO's/PSO's, and CO's
- **2.** Designing appropriate Outcome Based Curriculum.
- **3.** Deliberate Planning of Teaching-Learning Process.
- Continuous Evaluation using suitable assessment methods and tools at apt time



# Figure 4.3: Implementation Strategy of OBE

Since OBE focuses on student competency, it concentrates on the outcomes or goals instead of just marks or scores. So the goals which could be a certain number of skills and knowledge that the learner should have at the end of the course. The assessment methods are defined to measure the achievement of these goals. The teacher's take the role of being facilitators and mentors. Constructive feedback from the students also helps in reshaping the curriculum.

#### STEPS

- 1. Assessment of curriculum and needs
- 2. Defining outcomes
- 3. Collaboration and Implementation
- 4. Defining the role of assessments and results, and measuring success.
- 5. Feedback and continuous evaluation

#### **5. OBE FRAME WORK OF INSTITUTE**

The OBE framework is designed to guide an institution's academic programs, ensuring that all students achieve the skills, knowledge, and competencies necessary to succeed in their chosen fields. It focuses on measurable learning outcomes, continuous assessment, and alignment of curriculum, teaching methods, and assessments to these outcomes.

### 5a . Process to Define Vision, Mission And PEO's

#### (i)Process for Defining Vision and Mission

The Department Vision and Mission statements are defined through the views of internal and external stakeholders with the consideration of quality education and imparting research, innovation and entrepreneurship for producing graduates with ethical and moral values to meet the requirements of society and industry. The process for defining the vision and mission of the Department is illustrated in Fig.5.1



The following steps are involved in confirming the alignment of department vision and mission with institution vision and mission.

Step1:Institute vision and mission statements are taken as primary input.

Step2: Views and suggestions are collected from both internal stakeholders (management, faculty, and students) and external stakeholders (alumni, parents, employers, industry experts, and academic experts) based on institute vision and mission statements.

Step3: In Program Assessment Committee (PAC) meeting, the discussion and depiction of department vision and mission based on the input of stakeholders and formation of drafting is done and it is forwarded to Department Advisory Committee (DAC).

Step4: Review of Department Vision and Mission is done in DAC meeting and it is forwarded to the Governing Council for approval .

Step5:Governing council approves the Vision and Mission of the Departmentand disseminated to the stake holders.

Sample: Vision and Mission formulated for B.E- Electronics and Communication

# Engineering programme

### Vision

Electronics and Communication Engineering department aims to empower the budding engineers with technological excellence to meet current and imminent challenges in creative research and employment.

# Mission

- To cater all necessary inputs to excel in electronics knowledge both in theory and practical.
- To develop leadership and entrepreneurship qualities with social and ethical values.
- To provide the opportunities for innovation & collaborative research with industry.

# ii) Process for defining PEOs of the Program:

The Department Program Educational Objectives (PEOs) are defined through transparent review process involving internal and external stakeholders. The process of defining PEOs is illustrated in Fig 5.2.



**Figure 5.2 Processes for Establishing PEOs** 

The following steps are involved in confirming the alignment of Department PEOs with institution vision and mission.

Step 1: The Institute and Department vision, mission statements, along with the Program Outcome Statements, serve as the primary input.

Step 2:Views and suggestions are collected from both internal stakeholders (management, faculty, and students) and external stakeholders (alumni, parents, employers, industry experts, and academic experts).

Step 3:In Program Assessment Committee (PAC) meeting, the discussion and depiction of department Program Educational Objectives (PEOs) based on the input of stakeholders and Formation of draft PEOs is done and it is forwarded to Department Advisory Committee (DAC).

Step 4: Review and approval of PEOs are done by DAC. The final version of PEOs are presented to the governing council.

Step 5: Approved PEOs are published and disseminated to the stakeholders

# Programme Educational Objectives (PEO's)

Programme Educational Objectives (PEOs) are broad statements that describe the career and professional accomplishments that the programme is preparing the graduates to achieve. PEO's are measuredaround4-5yearsaftergraduation.PEO'scanbemeasuredbyaPO-PEOmatrix.Thesemaybe guided by global and local needs, vision of the institution, long term goals, etc.

# On successful completion of the programme, the students will be able to:

PEOs	Statement
PEO 1	Graduates will have the potential to become globally competent team players and leaders in the allied fields of electronics and communication engineering
PEO 2	Graduates will have the core technical skills and knowledge that will empower them to pursue lifelong learning and research
PEO 3	Graduates will deliver innovative solutions and services to address industrial and societal challenges, upholding ethical principles and social responsibility.

### 5b. BLOOM'S TAXONOMY AND ACTION VERBS FOR COURSE OUTCOMES

#### **Bloom's Taxonomy of Educational Objectives**

Bloom's Taxonomy is a hierarchical model that categorizes learning objectives in to varying levels of complexity (arranged in an order), from basic knowledge and comprehension to advanced evaluation and creation (Bloom, 1956). The taxonomy provides different levels of learning objectives, divided by complexity. Only after a student masters one level of learning goals, through formative assessments, corrective activities, and other enrichment exercises, can they move onto the next level (Guskey, 2005). Bloom's Taxonomy should be applied when creating learning objectives. At the end of the learning process, the goal of Bloom's taxonomy is that a student has sharpened a new skill, level of knowledge, and/or developed a different attitude towards the subject. Also, teachers are able to effectively evaluate this learning on an ongoing basis, as the course moves through each stage of the framework.

#### **Domains of Learning**

Bloom's Taxonomy comprises of three learning domains: cognitive, affective, and psychomotor. Within each domain, learning can take place at a number of levels ranging from simple to complex. Designers, trainers and educators often refer to the(Knowledge [cognitive], Skills [psychomotor], and Attitudes [affective]). After a learning experience, the learner should possess a new skill, knowledge, and/or attitude.



# Figure 5.3: Domains of Learning

#### Bloom's Taxonomy (Cognitive Domain):Original and Revised Versions

Bloom's Taxonomy classifies learning objectives for students, from recalling facts to producing new and original work. The framework elaborated by Bloom and his collaborators consisted of six major categories under cognitive domain: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. The categories after Knowledge were presented as "skills and abilities," with the understanding that knowledge was the necessary precondition for putting these skills and abilities into practice.

A group of cognitive psychologists, curriculum theorists and instructional researchers, and test in grand assessment specialists published in 2001 are vision of Bloom's Taxonomy with the title:"A Taxonomy for Teaching, Learning, and Assessment". In the revised taxonomy, two dimensions are presented in the cognitive domain: the knowledge dimension and the cognitive dimension. There are four levels on the knowledge dimension: factual, conceptual, procedural and Meta cognitive. There are six levels on the cognitive process dimension: remembering, understanding, applying, analyzing, evaluating, and creating. The new taxonomy enables teachers to think more in depth about the content that they are teaching and the objectives they are focusing on within the classroom. It allowed teachers to categorize objectives in a more-multidimensional way and to do so in a manner that allows them to see the complex relationships between knowledge and cognitive processes.

#### **Dimensions of Knowledge**

Thedimensionofknowledgeisfocusedon'Knowingwhat'.Theknowledgedimens ion represents a range from concrete (factual) to abstract (meta cognitive). Knowledge is characterized under the following four dimensions.

#### 1. Factual Knowledge

- Knowledge of terminology
- Knowledge of specific details and elements

# 2. Conceptual Knowledge

- Knowledge of classifications and categories
- Knowledge of principles and generalizations
- Knowledge of theories, models, and structures

# 3. Procedural Knowledge

- Knowledge of subject-specific skills and algorithms
- Knowledge of subject-specific techniques and methods
- Knowledge of criteria for determining when to use appropriate procedures.

# 4. Meta cognitive Knowledge

- Strategic knowledge
- Knowledge about cognitive tasks, including appropriate contextual and Conditional knowledge
- Self-knowledge



Figure 5.4: Revised Bloom's Taxonomy

# ACTIONVERBS-COGNITIVEDOMAIN

	LOWER ORDER			HIGHER ORDER		
Levels	Remember	Understand	Apply	Analyze	Evaluate	Create
Overview	Recalling basic facts and concepts	Explaining ideas or concepts	Using information in new situations	Drawing connections among ideas	Justifying a stand or decision	Produce new or original work
Action Verbs	<ul> <li>Define</li> <li>Identify</li> <li>Label</li> <li>List</li> <li>Name</li> <li>Recall</li> <li>State</li> <li>Choose</li> <li>Enumerate</li> <li>Find</li> </ul>	<ul> <li>Describe</li> <li>Discuss</li> <li>Explain</li> <li>Locate</li> <li>Paraphrase</li> <li>Give Example</li> <li>Translate</li> <li>Annotate</li> <li>Classify</li> </ul>	<ul> <li>Apply</li> <li>Carryout</li> <li>Demonstrate</li> <li>Illustrate</li> <li>Prepare</li> <li>Solve</li> <li>Use</li> <li>Adapt</li> <li>Advise</li> <li>Build</li> </ul>	<ul> <li>Analyze</li> <li>Categorize</li> <li>Compare</li> <li>Contrast</li> <li>Differentiate</li> <li>Discriminate</li> <li>Outline</li> <li>Detect</li> <li>Diagnose</li> <li>Diagram</li> </ul>	<ul> <li>Assess</li> <li>Conclude</li> <li>Evaluate</li> <li>Interpret</li> <li>Justify</li> <li>Measure</li> <li>Support</li> <li>Appraise</li> <li>Argue</li> <li>Critique</li> </ul>	<ul> <li>Combine</li> <li>Construct</li> <li>Design</li> <li>Develop</li> <li>Generate</li> <li>Plan</li> <li>Propose</li> <li>Create/Compile</li> <li>Compose</li> <li>Discover</li> </ul>

 • Group	• Convert	• Change	• Dissect	• Debate	• Expand
• Match	• Exemplify	• Choose	• Distinguish	• Decide	• Formulate
Reproduce	• Generalize	• Compute	• Examine	• Deduce	• Improve
• Sort	• Infer	• Customize	• Separate	• Defend	• Invent
• Recognize	• Мар	• Dramatize	<ul> <li>Simplify</li> </ul>	• Determine	• Integrate
	• Organize	• Employ	• Survey	• Disprove	• Manage
	• Relate	• Implement	• Test for	• Estimate	• Prepare
	• Select	• Manipulate	• Trace	• Forecast	• Produce
	• Show	<ul> <li>Modify/Alter</li> </ul>	• Correlate	• Judge	• Synthesize
	• Summarize	Investigate			
	• Translate				
	• Restate				
	• Extrapolate				

### ACTIONVERBS-AFFECTIVEDOMAIN

	LOWER	ORDER		HIGHER ORDER			
Levels	Receiving	Responding	Valuing	Organization	Internalizing		
Overview	Selective attention to stimuli	Responding to stimuli	Attaching value or worth to something	Conceptualizing the value and resolving the Conflict between it and other values	Integrating the value in to a value system that controls behavior		
Action Verbs	<ul> <li>Accept</li> <li>Acknowledge</li> <li>Be aware</li> <li>Listen</li> <li>Notice</li> <li>Pay attention</li> <li>Tolerate</li> </ul>	<ul> <li>Agree to</li> <li>Answer freely</li> <li>Assist</li> <li>Care for</li> <li>Communicate</li> <li>Comply</li> <li>Confirm</li> </ul>	<ul> <li>Adopt</li> <li>Assume</li> <li>responsibility</li> <li>Behave according to</li> <li>Choose</li> <li>Commit</li> <li>Desire</li> </ul>	<ul> <li>Adapt</li> <li>Adjust</li> <li>Arrange</li> <li>Balance</li> <li>Classify</li> <li>Conceptualize</li> <li>Formulate</li> <li>Group</li> </ul>	<ul> <li>Act upon</li> <li>Advocate</li> <li>Defend</li> <li>Exemplify</li> <li>Influence</li> <li>Justify behavior</li> <li>Maintain</li> <li>Serve</li> </ul>		

	<ul> <li>Consent</li> <li>Contribute</li> <li>Cooperate</li> <li>Follow</li> <li>Obey</li> <li>Participate willingly</li> <li>Read voluntarily</li> <li>Respond</li> </ul>	<ul> <li>Exhibit loyalty</li> <li>Express</li> <li>Initiate</li> <li>Prefer</li> <li>Seek</li> <li>Show concern</li> <li>Use resources to</li> </ul>	<ul> <li>Organize</li> <li>Rank</li> <li>Theorize</li> </ul>	• Support
--	--	--	--	-----------

# **ACTIONVERBS-PSYCHOMOTORDOMAIN**

	LOWER	RORDER		I	HIGHERORDER		
Levels	Perception	Set	Guided Response	Mechanism	Complete Overt Response	Adaption	Origination
Overview	Senses cues that guide motor activity	Mental, emotional and physical readiness to act	Imitation and practice of skills often in discrete steps	Performing acts with increasing efficiency, confidence and proficiency	Automatic performance	Adapting skill sets to meet a problem situation	Creating new patterns for specific situations.
Action Verbs	<ul> <li>Detect</li> <li>Hear</li> <li>Listen</li> <li>Observe</li> <li>Perceive</li> <li>Recognize</li> <li>See</li> <li>Sense</li> <li>Smell</li> <li>Taste</li> </ul>	<ul> <li>Achieve <ul> <li>a</li> <li>posture</li> </ul> </li> <li>Assume a</li> <li>body stance</li> <li>Establish a</li> <li>body</li> <li>position</li> <li>Place</li> <li>hands,</li> </ul>	<ul> <li>Copy</li> <li>Duplicate</li> <li>Imitate</li> <li>Manipulate with guidance</li> <li>Operate under supervision</li> <li>Practice</li> <li>Repeat</li> </ul>	<ul> <li>Complete with confidence</li> <li>Conduct</li> <li>Demonstrate</li> <li>Execute</li> <li>Improve</li> <li>efficiency</li> <li>Increase speed</li> </ul>	<ul> <li>Act habitually</li> <li>Advance with assurance</li> <li>Control</li> <li>Direct</li> <li>Excel</li> <li>Guide</li> <li>Maintain efficiency</li> </ul>	<ul> <li>Adapt</li> <li>Reorganize</li> <li>Alter</li> <li>Revise</li> <li>Change</li> <li>Modify</li> </ul>	<ul> <li>Design</li> <li>Originate</li> <li>Combine</li> <li>Compose</li> <li>Construct</li> </ul>

	arms ats			Managa	
• View • Watch	Position     the body	• Try	Make     Pace     Produce	<ul> <li>Manage</li> <li>Master</li> <li>Organize</li> </ul>	
	Sit     Stand     Station		• Show dexterity	<ul> <li>Perfect</li> <li>Perform automatically</li> </ul>	

# 5c.POs, PSO's and COs

#### **PROGRAMME OUTCOMES**

PO's are specific, measurable statements that describe what students are expected to know and be able to do by the time they graduate from a particular academic program. They represent the broad skills, knowledge, and competencies that students should acquire during their educational journey. Program Outcomes are typically aligned with the educational objectives of the program and reflect the skills necessary for success in the professional world, as well as lifelong learning.

POs	Graduate Attributes	Statements
PO1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/ development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
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.
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

On successful completion of the programme, the students will be able to:

		with an understanding of the limitations.
		Apply reasoning informed by the contextual knowledge to
	The engineer and	assess societal, health, safety, legal and cultural issues
PO6	society	and the consequent responsibilities relevant to the
		professional engineering practice.
	Environment and	Understand the impact of the professional engineering
	sustainability	solutions in societal and environmental contexts, and
PO7	sustamability	demonstrate the knowledge of, and need for sustainable
		development.
		Apply ethical principles and commit to professional ethics
	Ethics	and responsibilities and norms of the engineering
PO8		practice.
		Function officially as an individual and as a member or
PO9	Individual and	Function effectively as an individual, and as a member or
	team work	leader in diverse teams, and in multidisciplinary settings.
		Communicate effectively on complex engineering
		activities with the engineering community and with
	Communication	society at large, such as, being able to comprehend and
PO10		write effective reports and design documentation, make
		effective presentations, and give and receive clear
		instructions.
		Demonstrate knowledge and understanding of the
	Project	engineering and management principles and apply these
PO11	management and	to one's own work, as a member and leader in a team, to
	finance	manage projects and in multidisciplinary environments
	mance	manage projects and in multidisciplinary environments.
		Recognize the need for, and have the preparation and
PO12	Life-long learning	ability to engage in independent and life-long learning in
		the broadest context of technological change.

# **PROGRAMME SPECIFIC OUTCOMES**

Program Specific Outcomes (PSOs) are detailed statements that describe the knowledge, skills, and abilities that students are expected to acquire in their specific discipline by the end of the program. These outcomes reflect the unique aspects of the program's curriculum and its application to real-world problems, preparing graduates to excel in industry, research, or higher education within their specialized field.

PSOs of B.E. - Electronics and Communication Engineering programme

On successful completion of the programme, the students will be able to:

PSOs	Statements
	Analyze, Design, Simulate and Integrate Electronic Circuits and Systems for
F301	given specifications.
DSO2	Apply the technical knowledge to solve complex problems in the areas like
P302	signal processing, Communication, VLSI design and Embedded Systems.

# COURSEOUTCOMES

COs are the statements of knowledge/ skills / abilities that students are expected to know, understand and perform as a result from their learning experiences in each course. In order to graduate from a programme, students must pass a significant number of required courses (subjects) with at least a minimal proficiency level (often in the form of marks or grades), as set forth by the affiliating university. Usually, a university gives a syllabus that the institution must adhere to. The syllabus specifies the teaching strategy and content for each course. Course Outcomes (COs) are the measurable parameters which evaluate the student performance for each course that the student undertakes in every semester.

CO's are also referred to as Course Learning Outcomes (CLOs).

#### Guidelines

- COs should aim to develop higher order skills in each Domain of Learning.
- Typically 5 CO's are identified per Course.
- The CO statements are defined by considering the course content covered in each module of a course. On average, a typical CO is expected to take between 5 unit in a 45 period course.
- Attainment of each CO should lead to attainment of one or more PO's.

#### **DEFINING COURSE OUTCOMES**

Course Outcomes (COs) are statements clearly describing the meaningful, observable and measurable knowledge, skills and/or dispositions that the students will earn in a particular course – the essential knowledge, abilities, and attitudes that constitute the basic learning needed by a graduate of this course. These are major domain specific outcomes written using action verbs which are specific, measurable, achievable, realistic and time-bound (SMART) and can be demonstrated by students on completion of each course. A well written CO facilitates teachers in measuring the achievement of the CO at the end of each course. It also helps the teachers in designing suitable delivery and assessment methods to achieve the designed CO's. CO's can be defined and verified by using SMART principle as given below.

There are 3 types of Course Learning Outcomes:

- 1) Cognitive Outcomes: "What will the students know after completing a course?"
- Behavioral Outcomes: "What will the students be able to do after completing a course?"
- 3) Affective Outcomes: "What will the students care about or think after completing this course?"

Well-written learning outcomes involve the following parts:

- Action verb
- Level of achievement
- Subject content
- Condition of performance (if applicable)

#### **Good Course Outcomes**

Course Outcomes (COs) are central to a course's curriculum. They articulate to students, faculty, and other stakeholders what students will achieve in each course and how their learning will be measured. Good Course Outcomes use action verbs to specify the demonstrable and measurable knowledge, skills or dispositions possessed by students completing this course. Instead of using vague and not easily observable or measurable verbs or phrases like know, understand, appreciate, be aware of, learn comprehend, or become familiar with, is used .Good COs *employ specific verbs* like, compile, identify, create, plan, revise, analyze, design, select, utilize, apply, demonstrate, prepare, use, compute, discuss, explain, predict, assess, compare, rate, critique, outline, or evaluate.

#### Steps to write a good CO

The primary footstep in writing a good CO is to identify and select the essential, distinct, measurable and demonstrable learning that the students are expected to achieve in a particular course of a programme and under specific programmed is discipline and that will support or advance the learning outcomes of the department and the institution. For every identified and chosen learning outcome, the following precautions are undertaken.

- 1. Select an action verb using Bloom's Taxonomy identifying the specific student knowledge, skill or disposition to be demonstrated.
- 2. Clearly identify the subject content focusing on specific knowledge, skill or disposition that the students are expected to be able to demonstrate.
- 3. Decide if the CO requires either a level of achievement or a condition of performance. A level of achievement identifies how proficient students need to be in a task. A condition of performance identifies if students are performing this particular outcome in a specific context only and hence may not be needed for every CO.
- 4. Be certain to pair each CO with one or more learning activities that will allow the students to achieve this outcome and permit faculty to measure this achievement



#### Figure 5.5: Parts of Good Learning Outcome

# Sample course outcomes

(Electronics and Communication Engineering programme)

Course Name: Signals and Systems

Course code: EC3354

Exam Duration: 3Hrs

Credits: 4

On successful completion of the course, the students will be able to:

Cos	Statements	Bloom's Level of COs
CO1	Classify the basic continuous time and discrete time signals and explain the properties such as periodicity, even or odd, energy or power and system properties such as causality, linearity and time-invariance.	К2
CO2	Identify the frequency response of continuous time systems by applying Fourier series, Fourier transform and Laplace Transform	K3
C03	Identify the response of an Linear Time Invariant systems for a given continuous time input signal by using convolution integrals, differential equations, Fourier and Laplace transform. and Block diagram representation.	K3
CO4	Identify the frequency response of discrete time systems by applying Discrete time Fourier transform and Z Transform.	K3
CO5	Identify the response of an Linear Time Invariant systems for a given Discrete time input signal by using convolution sum, difference equations, Discrete Fourier transform and Z transform. and DT system connected in series and parallel	K3

K1-Remember K2-Understand K3-Apply K4 -Analyze K5 -Evaluate K6 -Create

# 5 d.CO-PO AND CO-PSO MAPPING

All the courses together must cover all the POs (and PSOs). For a course, the COs are mapped to the Pos through the CO-PO matrix and to the PSOs through the CO-PSO matrix as shown below. The various correlation levels are:

- "1"-Slight (Low) Correlation
- "2"-Moderate (Medium) Correlation
- "3"-Substantial (High) Correlation
- "-"—indicates there is no correlation.



# Fig 5.6: CO, PO & PSO MAPPING

# Mapping for the courses

CO'S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2														
CO3														
CO4														
CO5														
Avg														

#### SAMPLE CO-PO MAPPING

(Electronics and Communication Engineering programme)

Course Name: Signals and Systems

Course code: EC3354

# **CO-PO Matrix**

COs	PO	РО	РО	PO	РО							
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	1	1	-	-	-	-	-	-	-	2
CO2	3	2	1	1	-	-	-	-	-	-	-	2
CO3	3	2	1	1	-	-	-	-	-	-	-	2
CO4	3	2	1	1	-	-	-	-	-	-	-	2
C05	3	2	1	1	-	-	-	-	-	-	-	2

\*High-3; Medium-2;Low-1

# **CO-PSOMATRIX**

COs	PSO1	PSO2
C01	2	3
CO2	2	3
CO3	2	3
CO4	2	3
CO5	2	3

\*High-3; Medium-2; Low-1



#### **Target Levels for Attainment of Course Outcomes**

The course outcome attainment is assessed in order to track the graduate performance against the target level of performance. The CO attainment is the tool used for continuous improvement through appropriate learning & teaching strategies of the course.

The course outcome attainment is measured or calculated in order to assess student performance with respect to abilities.

The course outcome attainment becomes the basis for Program Outcome Attainment calculation.

#### **Target level for Attainment of Program Outcomes/Program Specific Outcome**

The program outcome attainment is assessed in order to track the performance of the graduates against the target level of performance. The PO attainment is the tool used for continuous improvement in the graduate's abilities through appropriate learning & teaching strategies.

The course outcome attainment is calculated in order to calculate the program outcome attainment.

The set target level ensures continuous improvements in the graduate's performance.

#### **Assessment of CO**

A set of performance evaluation criteria is used for the quantitative assessment of CO's. Thus, the attainment of CO's provides evidence of the attainment of PO's and PSO's.

**Course Assessment** is the sum of Direct Assessment and Indirect Assessment. Direct Attainment is computed based on the marks obtained by students in the respective Assessment Tools and Indirect Attainment is computed from the Course End Survey and employer survey.

# **Program Outcome and Program Specific Outcomes Assessment Method**



#### Figure 5.8: ASSESMENT METHOD OF PO & PSO

(Describe the assessment tools and processes used to gather the data upon which the evaluation of each of the Program Outcomes and Program Specific Outcomes is based indicating the frequency with which these processes are carried out. Describe the assessment processes that demonstrate the degree to which the Program Outcomes and Program Specific Outcomes are attained and document the attainment levels)

The flow chart representing the procedure to calculate the attainment of POs and PSOs is depicted in Figure 5.8. The following are the steps involved in the calculation of POs and

PSOs attainment levels

- The DAC meeting is convened during which the target for POs and PSOs are fixed
- The assessment tools to calculate PO and PSO attainment levels are classified as follows:
  - A. Direct assessment
  - B. Indirect assessment

# A. Direct Assessment:

# **Direct Assessment of POs and PSOs:**

Attainment of POs and PSOs are obtained through the calculation of COs of all courses

# i. Calculation of Expected POs and PSOs Attainment Level

- A correlation matrix of COs of each course with POs and PSOs is created with appropriate levels 3- High, 2- Medium and 1- Low.
- The direct attainment of each POs and PSOs are calculated using the correlation matrix of COs to POs and PSOs.
- After mapping the POs and PSOs with COs; the average of all POs and PSOs are calculated.

# ii. Calculation of Actual POs and PSOs Attainment Level

> The PO and PSO attainment levels are calculated as follows.

# **Attainment Level:**



Fig 5.9- Attainment Level

<b>Evaluation Methods</b>	Process
Internal Assessment Tests	Three Internal Assessment Tests are conducted per semester to evaluate the attainment of course outcomes. Each question is mapped with COs and blooms level.
Assignments &Tutorials	The tutorials and assignments are given to the students based on the subject nature. For four credit papers tutorials are mandatory. Tutorial and Assignment sheets are prepared by the faculty member with COs and levels.
Continuous Assessment& Model Exam (Laboratory Course)	The evaluation criteria for each experiment are based on performance, viva-voce and record mark. The attainment of COs is calculated through continuous assessment and model practical performance.
Project Reviews	Three reviews are conducted periodically to monitor and evaluate the progress of the project using project rubrics. Viva-Voce is conducted at the end of the semester as per University norms.
University Examination	At the end of each semester, final examination is conducted for Theory and Laboratory courses by Anna University, in which question paper covers the entire syllabus and all the Cos are covered in the question papers.

# **Assessment Process for Theory Courses:**

#### **Table A- Assessment Process for Theory Courses**

ASSSESSMENT FOR THEORY COURSES								
Assessment	Internal Assessn	External Assessment						
Methods	Continuous Internal Assessments	Assignments/ Quiz	University Exam					
Assessment Period	Three Per Semester	As Required	Once Per Semester					
Assessed by	Faculty Membe	External Examiner						
Reviewed by	Head of the Department a	University						

#### **Internal Assessment**

Attainment Level = 1, if 60% of students secured 60% of Marks and above Attainment Level = 2, if 70% of students secured 60% of Marks and above Attainment Level = 3, if 80% of students secured 60% of Marks and above

#### **External Assessment**

The attainment level and target levels of each course are fixed as follows: Attainment Level = 1, if 60% of students secured B grade and above Attainment Level = 2, if 70% of students secured B grade and above Attainment Level = 3, if 80% of students secured B grade and above

#### Table B - CO Attainment calculation through direct assessment

CO Attainment Level through Direct Assessment	=	(0.5 x Attainment level based on External Assessment) <b>+</b> (0.5 x Attainment level based on Internal Assessment)
---	---	---

# **Direct Assessment Process for Lab Courses:**

ASSSESSMENT FOR LABORATORY COURSES							
Assessment	Internal Asse	External Assessment					
Methods	Evaluation of	Model Exam	University Exam				
	Experiments	Model Lxam					
Assessment	Once per Experiment	Once per	Once Per Semester				
Period	once per Experiment	Semester	Once i el Semester				
Assassed by	Eaculty Me	mber	Internal and External				
Assessed by	Taculty Me	IIIDei	Examiner				
Reviewed	Head of the Departme	ent and Principal	University				
by							

# **Table C - Direct Assessment Process for Laboratory Courses**

#### **Internal Assessment**

Attainment Level = 1, if 60% of students secured 80% of Marks and above Attainment Level = 2, if 70% of students secured 80% of Marks and above Attainment Level = 3, if 80% of students secured 80% of Marks and above

# **External Assessment**

The attainment level and target levels of each course are fixed as follows: Attainment Level = 1, if 60% of students secured more than A grade Attainment Level = 2, if 70% of students secured more than A grade Attainment Level = 3, if 80% of students secured more than Agrade

#### Table D - CO Attainment calculation through direct assessment

CO Attainment Lovel		(0.5 x Attainment level based on External
through Direct	=	Assessment) +
Assessment		(0.5 x Attainment level based on Internal
Assessment		Assessment)

### **Direct Assessment Process for Project Work:**

	ASSSESSMENT FOR PROJECT WORK								
Assessment	Internal Assessment	External Assessment							
Methods	Reviews	Viva – Voce							
Assessment Period	Four Reviews	Once Per Semester							
Assessed by	Project Supervisor, Project Co- coordinator	Internal and External Examiner							
Reviewed by	Head of the Department and Principal	University							

#### **Table E - Direct Assessment Process for Project Work**

#### **Internal Assessment:**

Attainment Level = 1, if 60% of students secured 80% of Marks and above Attainment Level = 2, if 70% of students secured 80% of Marks and above Attainment Level = 3, if 80% of students secured 80% of Marks and above

#### **External Assessment:**

The attainment level and target levels of each course are fixed as follows: Attainment Level = 1, if 60% of students secured more than A grade Attainment Level = 2, if 70% of students secured more than A grade Attainment Level = 3, if 80% of students secured more than Agrade

#### Table F - CO Attainment calculation through direct assessment

CO Attainment Lovel	=	(0.5 x Attainment level based on External
through Direct		Assessment) +
Assessment		(0.5 x Attainment level based on Internal
Assessment		Assessment)

#### a. POs and PSOs Attainment calculation through direct assessment

POs and PSOs attainment level	=	Level of PO mapped with CO $\times$ Attainment level of CO 3
-------------------------------	---	---

# SAMPLE CO CALCULATION:

JCT

#### JCT COLLEGE OF ENGINEERING AND TECHNOLOGY PICHANUR, COIMBATORE – 641105

NBR	NAAC	
ACCREDITED		
4 Courses PCE   EEE		
MECHICSE	GRADE	-

ACCREDITED BY

#### DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING ACADEMIC YEAR: 2020 -2021 (ODD SEMESTER) Internal Assessment -Attainment of Course Outcomes (Through Direct Assessment) ВАТСН 2018-2022 YEAR/SEM/ COURSE CODE EC8073 III/V/ECE CLASS COURSE TITLE MEDICAL ELECTRONICS TARGET(%) COURSE COORDINATOR BABU K TOTAL STRENGTH Level Range 50% of the students scored more than target ATTAINMENT LEVEL 60% of the students scored more than target 70% of the students scored more than target CIA I - MARKS ALLOTED CIA II - MARKS ALLOTED CIA III - MARKS ALLOTED Assignment / Mini Project /Tutorial / Seminar TOTAL COURSE OUTCOME NAME OF THE STUDENT **REG NO** S.NO C1 C2 C3 C4 C5 TOTAL COURSE OUTCOME 33 17 17 33 33 17 10 10 43 34 33 33 27 ABISHA F ANOOP.R 12 15 12 13 23 8 18 27 13 23 ARIF.S ARUNKUMAR S 13 14 14 20 27 10 7 5 20 28 DHILSHIYA M 32 16 11 27 31 16 11 28 GOPIKA ANAND K 28 14 26 13 8 9 36 GOPINATH L 12 25 JAYABHARATHI.A 8 15 23 11 8 15 27 JERBY J J 26 14 12 29 KARTHIKESWARAN R P 14 14 19 12 8 10 15 22 24 KOYLATH ATHUL PREMARAJAN MALARKODI.R 27 13 8 31 14 14 23 MATHEESH M 12 24 18 16 MUHAMMED ANSHID K 29 10 15 31 31 16 9 18 15 PRIYANKA.K RAJALAKSHMI.G 12 11 22 6 8 11 20 REJIL KRISHNAN N.R. 13 12 26 12 8 13 10 22 9 SIVA G 30 16 SREE KAVINAYA S 32 16 SUBALAKSHMLR 31 14 14 29 27 14 SURIYA PRIYA M 9 11 10 20 20 7 28 15 9 SUSMA J V 30 15 12 28 15 14 24 10 YUVARAJ M CO's Target Valu 25.8 20.4 19.8 19.8 16.2 No. of Students scored above CO's Target Value 47.83 78.26 69.565 82.61 Percentage of Students scored above Target 52.17 CO Att CO attainment Values to plot the Graph CO Expected Vs. CO Attained



JCT/IQAC/AC18a/Rev.No.00/25.06.23

JCT COLLEGE OF ENGINEERING AND TECHNOLOGY JCT PICHANUR, COIMBATORE – 641105



#### DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING ACADEMIC YEAR 2020-2021

#### **COURSE OUTCOME ATTAINMENT - UNIVERSITY EXAMINATION**

Class / Year / Section

:III/ YER / V SEMESTER

Course Code & Name EC8073- MEDICAL ELECTRONICS

CO Atta	ainment Level	: 1 -(50% - 59% ), 2 -(60%-69%), 3	-(70% and Above)
S.No	Register No	Name	Univ. Grade
1	720918106001	ABISHA F	В
2	720918106003	ANOOP.R	В
3	720918106004	ARIF.S	В
4	720918106005	ARUNKUMAR S	В
5	720918106007	DHILSHIYA M	В
6	720918106009	В	
7	720918106010	U	
8	720918106012	JAYABHARATHI.A	В
9	720918106013	JERBY J J	U
10	720918106014	KARTHIKESWARAN R P	U
11	720918106015	KOYLATH ATHUL PREMARAJAI	<b>B</b> +
12	720918106016	MALARKODI.R	В
13	720918106017	MATHEESH M	U
14	720918106020	MUHAMMED ANSHID.K	<b>B</b> +
15	720918106021	PRIYANKA.K	U
16	720918106022	RAJALAKSHMI.G	U
17	720918106023	REJIL KRISHNAN.N.R	U
18	720918106024	SIVA G	U
19	720918106025	SREE KAVINAYA S	$\mathbf{B}^+$
20	720918106026	SUBALAK SHMI.R	U
21	720918106027	SURIYA PRIYA.M	U
22	720918106028	SUSMA J V	В
23	720918106030	YUVARAJ M	В
	No. of	Students Appeared	23
	No. o	of Students Passed	13
	P:	ass Percentage	56.5%
	N	o, of O Grade	0
	No	o. of A+ Grade	0
	Ν	0	
	N	3	
	N	o. of B Grade	10
	Target for co	urse outcome Attainment	6.0 GPA
	No of stu	dents above the target $CO(1)$ to $CO(5)$ Attainment $(9/2)$	13
		Attainment Level	1

#### JCT COLLEGE OF ENGINEERING AND TECHNOLOGY PICHANUR, COIMBATORE – 641105 DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



ACADEMIC YEAR 2020-2021 (ODD SEMESTER) EC8073-MEDICAL ELECTRONICS Academic Year : 2022- 2023

Сотр	CO-Attainment Internal (CO- INT) (Avg. Attainment of All section) (%)	ct Attainment in CO- Attainment University (CO-UNI) (Avg. Attainment of All section) (%)	Direct CO Attainment (0.50 x CO-INT + 0.50 x CO-UNI) (%)	CO Attainment Level
C305.1	0	1	0.50	0,50
C305.2	3	1	2.00	2.00
C305.3	2	1	1.50	1.50
C305.4	3	1	2.00	2.00
C305.5	1	1	1.00	1.00
(Level 1: 5	0-59% , Level 2: 6	0-69%, Level 3	:>=70%)	
	Course	Attainment		1.4

# SAMPLE PO CALCULATION

JCT

[														]
Mapping of	CO-PO-PSO													
Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C310.1	3.00	2.00	1.00	2.00	-	-	-	1.00	-	-	2.00	2.00	1.00	2.00
C310.2	2.00	2.00	1.00	2.00	-	-	-	1.00	-	-	2.00	2.00	1.00	2.00
C310.3	3.00	2.00	1.00	2.00	-	-	-	1.00	-	-	2.00	2.00	1.00	2.00
C310.4	3.00	2.00	1.00	2.00	-	-	-	1.00	-	-	2.00	2.00	1.00	2.00
C310.5	3.00	2.00	1.00	2.00	-	-	-	1.00	-	-	2.00	2.00	1.00	2.00
Level	2.80	2.00	1.00	2.00	-	-	-	1.00	-	-	2.00	2.00	1.00	2.00
PO-PSO At	tainment													
Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C310.1	3.00	2.00	1.00	2.00	-	-	-	1.00	-	-	2.00	2.00	1.00	2.00
C310.2	1.67	1.67	0.83	1.67	-	-	-	0.83	-	-	1.67	1.67	0.83	1.67
C310.3	1.50	1.00	0.50	1.00	-	-	-	0.50	-	-	1.00	1.00	0.50	1.00
C310.4	2.00	1.33	0.67	1.33	-	-	-	0.67	-	-	1.33	1.33	0.67	1.33
C310.5	2.50	1.67	0.83	1.67	-	-	-	0.83	-	-	1.67	1.67	0.83	1.67
Level	2.13	1.53	0.77	1.53	-	-	-	0.77	-	-	1.53	1.53	0.77	1.53

#### **Direct Assessment:**

Using Program Outcomes prescribed by NBA, the faculty member evaluates the Program Outcomes and Program Specific Outcomes through Internal Assessment Tests, Assignments / Tutorial and Group Discussion. PO will be evaluated by the CO-PO Mapping with the attainment value for each course. For each course, every faculty member decides the competency level and attainment level. The following table shows the tools and process for direct PO attainment.

PO Attainment	Tools	Process
Direct (CO	<ul> <li>Internal Assessment Test</li> <li>Assignments</li> <li>Tutorials</li> <li>Online Quiz</li> <li>University Examination</li> </ul> Performance <ul> <li>Viva Voce</li> </ul>	<ul> <li>Assignments / Tutorials / online quizzes are given periodically for the entire course to attain the specific PO's.</li> <li>Three Internal Assessment Tests are conducted per semester to evaluate the student performance.</li> <li>University Examination is conducted once in a semester as per Anna University Schedule</li> <li>Student Contribution in laboratory is evaluated based on the performance, Viva Voce, Presentation and Record Work.</li> </ul>
Attainment)	<ul><li>Record</li><li>Presentation</li><li>Group Discussion</li></ul>	<ul> <li>Model Practical examination is conducted for 100 marks for duration of 3 hours.</li> <li>University Examination is conducted once in a semester as per Anna University Schedule</li> </ul>
	• Project Reviews	<ul> <li>Students are divided into batches. Each batch consists of three to four students.</li> <li>Supervisors are allotted for each group.</li> <li>Zeroth reviews are conducted for the students to identify the area of project.</li> <li>Three reviews are conducted periodically to monitor and evaluate</li> </ul>

	the progress of the project.
	• Viva-Voce is conducted at the end
	of the semester.

<b>COs-POs and</b>	l PSOs	matrix	of all	the	courses:
--------------------	--------	--------	--------	-----	----------

COURSE CODE	Course Name	PO 1	<b>PO</b> 2	РО 3	<b>PO</b> 4	PO 5	PO 6	РО 7	РО 8	РО 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C101	Communicative English	2.00	-	-	-	2.00	-	-	-	2.00	3.00	2.00	2.00	-	-
C102	Engineering Mathematics-I	2.60	2.60	1.00	-	-	-	-	1.00	-	-	-	-	1.60	1.00
C103	Engineering Physics	2.20	1.00	1.00	-	1.20	1.00	1.00	-	-	-	-	1.00	1.00	-
C104	Engineering Chemistry	2.00	1.00	1.00	-	-	1.00	1.00	1.00	-	-	-	-	2.00	-
C105	Problem Solving and Python Programming	3.00	2.00	2.00	1.00	2.00	-	-	1.00	-	1.40	-	3.00	-	-
C106	Engineering Graphics	2.60	1.60	1.00	-	3.00	-	-	-	-	2.60	-	1.00	-	-
C107	Problem Solving and Python Programming Laboratory	3.00	2.00	2.00	2.00	3.00	-	-	2.00	2.00	2.00	-	3.00	-	-
C108	Physics and Chemistry Laboratory	2.00	1.00	-	-	1.00	-	1.00	1.00	1.00	2.00	-	2.00	-	-
C109	Technical English	2.00	-	-	-	2.00	-	-	-	3.00	3.00	-	3.00	-	-
C110	Engineering Mathematics-II	2.00	1.00	1.00	-	-	-	-	1.00	-	-	-	-	1.40	1.40
C111	Physics for Electronics Engineering	2.00	1.00	1.00	-	-	1.00	1.00	-	-	-	-	1.00	-	-
C112	Basic Electrical and Instrumentation Engineering	2.00	1.00	1.00	-	-	-	-	-	-	-	-	1.00	1.00	1.00
C113	Circuit Analysis	3.00	2.20	1.00	1.00	-	-	-	-	-	-	-	2.00	2.00	2.00
C114	Electronic Devices	2.00	2.00	1.00	-	-	-	-	-	-	-	-	2.00	2.00	2.00

C115	Circuits and Devices Laboratory	2.00	2.00	2.00	1.00	2.00	-	-	1.00	2.00	1.00	2.00	2.60	2.00	2.00
C116	Engineering Practices Laboratory	2.00	1.00	1.00	-	2.00	-	-	1.00	1.00	1.00	2.00	2.00	1.00	2.00
C201	Linear Algebra and Partial Differential Equations	1.00	2.00	-	-	-	-	-	-	3.00	3.00	-	1.80	1.00	2.60
C202	Fundamentals of Data Structures In C	2.40	1.80	1.40	1.00	-	-	-	-	-	1.00	-	1.00	2.40	1.40
C203	Electronic Circuits- I	2.40	1.80	1.40	1.00	-	-	-	-	-	1.00	-	1.00	2.40	1.40
C204	Signals and Systems	3.00	2.00	1.00	-	-	-	-	-	-	-	-	2.00	2.00	3.00
C205	Digital Electronics	2.00	2.00	1.00	-	-	-	-	-	-	-	-	2.60	2.00	3.00
C206	Control Systems Engineering	2.40	2.60	2.00	1.00	1.60	1.00	1.00	-	-	-	-	-	1.60	1.00
C207	Fundamentals of Data Structures In C Laboratory	3.00	2.00	1.00	1.00	1.00	-	-	2.00	1.00	2.00	-	2.00	2.00	1.00
C208	Analog and Digital Circuits Laboratory	3.00	2.00	1.00	1.00	2.00	-	-	1.00	1.00	1.00	-	1.00	3.00	1.00
C209	Interpersonal Skills/Listening & Speaking	2.00	-	-	-	2.00	-	-	-	3.00	3.00	2.00	2.00	-	-
C210	Probability and Random Processes	2.60	1.60	1.00	-	-	-	-	1.00	-	-	1.00	1.00	1.20	1.00
C211	Electronic Circuits II	2.80	2.20	1.40	1.00	-	-	-	-	-	1.00	-	1.00	2.20	1.80
C212	Communication Theory	3.00	2.00	2.00	2.00	2.00	2.00	-	-	-	-	1.00	2.00	1.00	2.00
C213	Electromagnetic Fields	2.00	1.00	1.00	-	1.00	-	-	-	-	-	-	1.00	1.00	1.00
C214	Linear Integrated Circuits	3.00	1.00	1.00	-	1.00	-	-	-	-	-	-	-	1.00	2.00
C215	Environmental Science and Engineering	2.20	1.20	1.00	-	-	1.00	3.00	1.20	-	-	-	1.00	-	-

					-	-	-	-					-		
C216	Circuits Design and Simulation Laboratory	3.00	2.00	1.60	1.00	1.40	-	1.00	1.00	1.00	1.00	-	1.00	3.00	1.60
C217	Linear Integrated Circuits Laboratory	3.00	2.00	1.40	1.00	1.20	-	-	2.00	1.00	1.00	2.00	1.00	2.60	1.60
C301	Digital Communication	2.40	2.40	1.00	-	-	-	-	-	1.00	-	-	2.00	1.00	2.00
C302	Discrete-Time Signal Processing	3.00	1.60	1.40	-	1.00	-	-	-	-	-	-	2.00	1.80	3.00
C303	Computer Architecture and Organization	3.00	2.00	2.20	1.40	-	2.60	3.00	2.60	-	1.60	2.60	1.00	2.60	2.00
C304	Communication Networks	2.40	1.40	1.00	-	-	-	-	2.00	-	1.00	-	2.00	2.00	2.00
C305	Medical Electronics	2.00	-	1.00	1.00	-	2.00	-	-	-	-	-	-	2.00	1.00
C306	Renewable Energy Sources	2.00	-	1.00	-	-	2.00	3.00	2.00	-	-	-	2.00	1.00	1.00
C307	Digital Signal Processing Laboratory	3.00	3.00	2.00	1.00	3.00	-	-	1.00	2.00	1.00	2.00	1.00	2.00	3.00
C308	Communication Systems Laboratory	2.40	2.00	1.20	2.00	-	-	-	2.00	1.00	1.00	2.00	2.40	2.00	2.60
C309	Networks Laboratory	2.60	1.40	1.20	-	2.00	-	-	1.00	2.00	2.00	-	2.00	2.00	1.00
C310	Microprocessors and Microcontrollers	2.80	2.00	1.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	1.00	2.00
C311	VLSI Design	2.20	2.00	1.20	2.00	-	-	-	1.00	-	-	-	2.40	2.00	2.60
C312	Wireless Communication	2.00	1.80	1.60	-	-	-	-	1.00	-	-	-	2.00	1.40	2.00
C313	Principles of Management	2.00	-	-	-	2.00	-	-	2.00	-	2.00	2.00	1.00	-	2.00
C314	Transmission Lines and RF Systems	2.00	1.80	1.60	1.00	-	-	-	-	-	-	-	1.00	1.80	2.40
C315	Wireless Networks	3.00	2.00	2.00	2.00	2.00	2.00	-	-	-	-	1.00	2.00	2.00	2.00

			1	1	r	1	r		r	r	n	1	1	r	
C316	Microprocessors and Microcontrollers Laboratory	2.00	2.00	1.00	1.00	2.00	-	-	1.00	2.00	1.00	1.00	2.00	2.00	2.00
C317	VLSI Design Laboratory	3.00	1.40	1.40	1.40	3.00	-	-	1.00	1.00	1.00	-	2.00	3.00	1.80
C318	Professional communication	1.00	-	-	-	2.00	-	-	-	2.00	3.00	2.00	2.00	-	1.00
C401	Antennas and Microwave Engineering	2.20	1.60	1.20	1.00	-	1.00	1.00	-	-	-	-	1.00	1.20	2.20
C402	Optical Communication	2.80	2.20	1.80	2.40	-	1.40	-	2.00	-	-	1.20	1.20	1.20	1.60
C403	Embedded and Real Time Systems	2.20	2.00	0.80	1.00	-	-	-	-	-	1.00	-	2.00	-	1.00
C404	Ad hoc and Wireless Sensor Networks	3.00	3.00	2.40	2.40	2.40	1.20	-	-	-	0.80	2.00	1.60	2.40	3.00
C405	Transducer Engineering	2.40	1.60	1.00	-	-	1.00	-	1.00	-	1.00	-	2.40	-	3.00
C406	Disaster Management	1.00	-	2.40	-	-	-	3.00	1.60	-	-	-	2.00	-	3.00
C407	Embedded Laboratory	3.00	1.40	1.40	1.40	3.00	-	-	1.00	1.00	1.00	-	2.00	3.00	3.00
C408	Advanced Communication Laboratory	2.80	2.20	1.80	1.60	1.80	1.60	-	1.00	1.00	2.00	1.00	2.00	1.20	3.00
C409	Professional Ethics in Engineering	1.00	-	-	-	-	2.00	1.50	3.00	2.00	1.00	2.00	3.00	-	2.00
C410	Satellite Communication	2.20	2.20	1.00	-	-	-	-	2.00	2.00	2.00	-	2.00	2.00	2.00
C411	Project Work	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
A	verage PO's & PSO's	2.41	1.86	1.41	1.38	1.80	1.46	1.47	1.44	1.63	1.57	1.70	1.79	1.85	1.93

# **B. Indirect Assessment:**



FIG 5.12: Indirect assessment

#### Indirect Assessment of POs and PSOs:

- > The Exit Survey is obtained for all the courses at the end of the VIII semester.
- In addition to this, Employer Survey is also considered for the attainment calculation of POs and PSOs.

#### Table b. POs and PSOs Attainment calculation through indirect assessment

		0.8 (Attainment through direct assessment)
Overall attainment	=	+ 0.2 (Attainment through indirect assessment)

- The frequency of data collection is every year. Similar procedure is followed for all the courses from first year to final year.
- Once the PO and PSO attainment is calculated, it is verified by the HoD.
- If the target set for POs and PSOs attainment is achieved consecutively for three batches, then the set target is revised to a higher value and the process is repeated for the next academic year. If the target set value for PO and PSO attainment is not achieved, corrective measures are taken to fill the gap and the same process is repeated for the next academic year.

# **INDIRECT SURVEY ANALYSIS**

#### **GRADUATE EXIT SURVEY**

### Sample Graduate Exit Survey Form



JCT COLLEGE OF ENGINEERING AND TECHNOLOGY PICHANUR,COIMBATORE-641105



# **GRADUATE EXIT SURVEY**

#### **Dear Students,**

You are aware that we, the faculty of department of ------, JCT College of Engineering and Technology are aiming for continuously improving the process and facilities so that we are able to offer quality education in tune with the requirements of the stakeholders especially students.

We are sure that as a fresh graduate coming out of this college you can give valuable inputs that will sincerely bank upon for improving our service. Kindly spare a few minutes and register your feedback in the questionnaire that follows,

		Ratings						
S.No.	Questionnaire	Good (3)	Average (2)	Below Average (1)				
1	Fundamental Knowledge in Mathematics, Science, Engineering and humanities.							
2	Capability to Identify, Formulate and analyze Engineering problems.							
3	Design / Development of complete Engineering problems and their solutions.							
4	Conduct Investigation of Complex Engineering Problems.							
5	Exhibit the ability to apply recent Technologies to solve contemporary and new problems.							
6	Understanding Professional Engineering solutions in societal and environmental contexts.							
7	Awareness to apply Engineering solutions in global, national and social contexts.							
8	Indulgent of Professional and ethical responsibilities.							
9	Aptitude to function as an effective member in multidisciplinary teams.							
10	Ability in the English language in both communicative and technical forms.							
11	Reveal the ability to desire and apply appropriate resource management techniques.							
12	Competent of self-education and a clear understanding of the value updating their professional knowledge to engage in lifelong learning.							

13	Analyze, Design, Simulate and Integrate Electronic Circuits and Systems for given specifications.
14	Apply the technical knowledge to solve issues in the areas like signal processing, Communication, VLSI design and Embedded Systems.

Suggestions if any :

# Nameof the Student: Register Number : Department : Batch : Date :

Signature of the Student

JCT

#### JCT COLLEGE OF ENGINEERING AND TECHNOLOGY PICHANUR,COIMBATORE-641105



#### GRADUATE EXIT SURVEY

#### Dear Students,

You are aware that we, the faculty of department of  $\underline{FCC}$ , JCT College of Engineering and Technology are aiming for continuously improving the process and facilities so that we are able to offer quality education in tune with the requirements of the stakeholders especially students.

We are sure that as a fresh graduate coming out of this college you can give valuable inputs that will sincerely bank upon for improving our service. Kindly spare a few minutes and register your feedback in the questionnaire that follows,

		Ratings			
S.No.	No. Questionnaire		Average (2)	Below Average (1)	
1	Fundamental Knowledge in Mathematics, Science, Engineering and humanities.	1			
2	Capability to Identify, Formulate and analyze Engineering problems.	1			
3	Design / Development of complete Engineering problems and their solutions.		~		
4	Conduct Investigation of Complex Engineering Problems.		~		
5	Exhibit the ability to apply recent Technologies to solve contemporary and new problems.		~		
6	Understanding Professional Engineering solutions in societal and environmental contexts.	~			
7	Awareness to apply Engineering solutions in global, national and social contexts.	1			
8	Indulgent of Professional and ethical responsibilities.	1			
9	Aptitude to function as an effective member in multidisciplinary teams.		5		
10	Ability in the English language in both communicative and technical forms.	~			
11	Reveal the ability to desire and apply appropriate resource management techniques.	~			
12	Competent of self-education and a clear understanding of the value updating their professional knowledge to engage in	~			

# JCT

#### JCT COLLEGE OF ENGINEERING AND TECHNOLOGY PICHANUR,COIMBATORE-641105



	lifelong learning.	-	
13	Analyze, Design, Simulate and Integrate Electronic Circuits and Systems for given specifications.	~	
14	Apply the technical knowledge to solve issues in the areas like signal processing, Communication, VLSI design and Embedded Systems.	~	

Suggestions if any :

Name of the Stude	nt: Susma J.V
Register Number	:720918106028
Department	: ECE
Batch	: 2018-2022
Date	: 02/11/2022.

Suga Signature of the Student

# **GRADUATE EXIT SURVEY – ANALYSIS**

PROGRAM : B.E

FEEDBACK COLLECTED : 23

BRANCH: ELECTRONICS & COMMUNICATION ENGINEERING

ACADEMIC YEAR: 2018-2022

PO's	Good (3 marks)	Fair (2 marks)	Average (1 marks)	Percentage of students granted good rating	Indirect Attainment
1	21	2	0	91	3
2	19	4	0	83	3
3	15	5	3	65	2
4	21	1	1	91	3
5	18	4	1	78	3
6	20	3	0	87	3
7	19	3	1	83	3
8	20	3	0	87	3
9	21	2	0	91	3
10	16	4	3	70	3
11	19	2	2	83	3
12	20	3	0	87	3

PSO's	Good (3 marks)	Fair (2 marks)	Average (1 marks)	Percentage of students granted good rating	Indirect Attainment
1	20	3	0	87	3
2	19	2	2	83	3

# **EMPLOYER SURVEY**

#### Sample Employer Survey Form



JCT COLLEGE OF ENGINEERING AND TECHNOLOGY PICHANUR, COIMBATORE-641105



#### **EMPLOYER SURVEY**

#### Dear Employer,

Many graduates of our Institution are already working in your organization. We are thankful to you for providing them employment in your prestigious organization.

We shall very much appreciate and be grateful to you if you can spare some of your valuable time to fill up this survey form which will help us to improve our Institution further. Kindly place relevant tick mark that describes your level of satisfaction at each question below,

		Ratings			
S.No.	Questionnaire	Good (3)	Average (2)	Below Average (1)	
1	Ability for development and analysis of engineering problems and formulation of suitable solutions, retaining of professional and ethical responsibilities.				
2	Capacity for self-education, capability to learn new skills and a clear appreciation for the value of lifelong learning to update professional knowledge.				
3	Understanding professional engineering solutions for sustainable development and their application in global, national and social contexts.				
4	Proficiency for acquiring new skills and applying them in research and development				
5	Fundamental knowledge in mathematics and science and professional fluency in English both communicative and technical forms.				
6	Deftness in the discrimination of management techniques and possession of leadership skills that enable the successful function and multi-disciplinary teams.				

Suggestions if any:		
Employer Name		
Designation	:	
Organization Name	:	
Date	:	Signature of the Employer

JCT

#### JCT COLLEGE OF ENGINEERING AND TECHNOLOGY PICHANUR, COIMBATORE-641105



#### **EMPLOYER SURVEY**

#### Dear Employer,

Many graduates of our Institution are already working in your organization. We are thankful to you for providing them employment in your prestigious organization.

We shall very much appreciate and be grateful to you if you can spare some of your valuable time to fill up this survey form which will help us to improve our Institution further. Kindly place relevant tick mark that describes your level of satisfaction at each question below,

			Ratings		
S.No.	Questionnaire	Good (3)	Average (2)	Below Average (1)	
1	Ability for development and analysis of engineering problems and formulation of suitable solutions, retaining of professional and ethical responsibilities.	/			
2	Capacity for self-education, capability to learn new skills and a clear appreciation for the value of lifelong learning to update professional knowledge.	/			
3	Understanding professional engineering solutions for sustainable development and their application in global, national and social contexts.		/		
4	Proficiency for acquiring new skills and applying them in research and development	/			
5	Fundamental knowledge in mathematics and science and professional fluency in English both communicative and technical forms.	/	6		
6	Deftness in the discrimination of management techniques and possession of leadership skills that enable the successful function and multi-disciplinary teams.	,	/		

Suggestions if any:

NiL

Employer Name : Kamalakannan. G Designation : HR Organization Name : Auriss Technologies Date : 15.11.2022.

latanna

Signature of the Employer

# **EMPLOYER SURVEY - ANALYSIS**

PROGRAM : B.E

# FEEDBACK COLLECTED : 10

# BRANCH: ELECTRONICS & COMMUNICATION ENGINEERING

ACADEMIC YEAR: 2018-2023

PO's	Good (3 marks)	Fair (2 marks)	Average (1 marks)	Percentage of students granted good rating	Indirect Attainment
1	10	0	0	100	3
2	10	0	0	100	3
3	8	1	1	80	3
4	6	3	1	60	2
5	6	3	1	60	2
6	8	1	1	80	3
7	8	1	1	80	3
8	10	0	0	100	3
9	6	3	1	60	2
10	10	0	0	100	3
11	6	3	1	60	2
12	6	3	1	60	2

PSO's	Good (3 marks)	Fair (2 marks)	Average (1 marks)	Percentage of students granted good rating	Indirect Attainment
1	9	1	0	90	3
2	10	0	0	100	3

# **INDIRECT ATTAINMENT**

# Average of Exit and Employer Survey

РО	Exit survey	Employer survey	Indirect Attainment
1	3	3	3
2	3	3	3
3	2	3	2.5
4	3	2	2.5
5	3	2	2.5
6	3	3	3
7	3	3	3
8	3	3	3
9	3	2	2.5
10	3	3	3
11	3	2	2.5
12	3	2	3

PSO	Exit survey	Employer survey	Indirect Attainment				
1	3	3	3				
2	3	3	3				

# **Overall PO and PSO attainment**

# **POs and PSOs Attainment calculation**

=

Overall POs and PSOs Attainment (80 % of Direct Assessment) + (20 % of Indirect Assessment)

# SAMPLE OF OVER ALL ATTAINMENT

#### **PO/PSO ATTAINMENT**

#### **COURSE WISE PO ATTAINMENT**

COURE CODE	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C101	Communicative English	1.93	-	-	-	1.93	-	-	-	1.93	2.90	1.93	1.93	-	-
C102	Engineering Mathematics-I	1.20	1.20	0.47	-	-	-	-	0.47	-	-	-	-	0.73	0.47
C103	Engineering Physics	1.10	0.50	0.50	-	0.60	0.50	0.50	-	-	-	-	0.50	0.50	-
C104	Engineering Chemistry	1.00	0.50	0.50	-	-	0.50	0.50	0.50	-	-	-	-	1.00	-
C105	Problem Solving and Python Programming	1.30	0.87	0.87	0.43	0.87	-	-	0.43	-	0.57	-	1.30	-	-
C106	Engineering Graphics	1.07	0.63	0.33	-	1.30	-	-	-	-	1.07	-	0.43	-	-
C107	Problem Solving and Python Programming Laboratory	3.00	2.00	2.00	2.00	3.00	-	-	2.00	2.00	2.00	-	3.00	-	-
C108	Physics and Chemistry Laboratory	2.00	1.00	-	-	1.00	-	1.00	1.00	1.00	2.00	-	2.00	-	-
C109	Technical English	1.93	-	-	-	1.93	-	-	-	2.90	2.90	-	2.90	-	-
C110	Engineering Mathematics- II	0.93	0.47	0.47	-	-	-	-	0.47	-	-	-	-	0.63	0.63
C111	Physics for Electronics Engineering	1.00	0.50	0.50	-	-	0.50	0.50	-	-	-	-	0.50	-	-

C112	Basic Electrical and Instrumentation Engineering	0.93	0.47	0.47	-	-	-	-	-	-	-	-	0.47	0.47	0.47
C113	Circuit Analysis	0.50	0.33	0.17	0.17	-	-	-	-	-	-	-	0.33	0.33	0.33
C114	Electronic Devices	0.40	0.20	0.25	-	-	-	-	-	-	-	-	0.40	0.40	0.40
C115	Circuits and Devices Laboratory	2.00	2.00	2.00	1.00	2.00	-	-	1.00	2.00	1.00	2.00	2.60	2.00	2.00
C116	Engineering Practices Laboratory	2.00	1.00	1.00	-	2.00	-	-	1.00	1.00	1.00	2.00	2.00	1.00	2.00
C201	Linear Algebra and Partial Differential Equations	0.17	0.33	-	-	-	-	-	-	0.50	0.50	-	0.33	0.17	0.47
C202	Fundamentals of Data Structures In C	1.00	0.83	0.67	0.50	-	-	-	-	-	0.50	-	0.50	1.17	0.67
C203	Electronic Circuits- I	1.03	0.77	0.60	0.43	-	-	-	-	-	0.43	-	0.43	1.03	0.60
C204	Signals and Systems	0.80	0.53	0.27	-	-	-	-	-	-	-	-	0.53	0.53	0.80
C205	Digital Electronics	1.60	1.60	0.80	-	-	-	-	-	-	-	-	2.07	1.60	2.40
C206	Control Systems Engineering	1.70	1.97	1.47	0.73	1.17	0.73	0.73	-	-	-	-	-	1.23	0.73
C207	Fundamentals of Data Structures In C Laboratory	2.80	1.87	0.93	0.93	0.93	-	-	1.87	-	1.87	-	1.87	1.87	0.93
C208	Analog and Digital Circuits Laboratory	2.50	1.67	0.83	0.83	1.67	-	-	0.83	0.83	0.83	-	0.83	2.50	0.83
C209	Interpersonal Skills/Listening & Speaking	1.73	-	-	-	1.73	-	-	-	2.60	2.60	1.73	1.73	-	-
C210	Probability and Random Processes	2.20	1.33	0.87	-	-	-	-	0.87	-	-	0.87	0.89	1.03	0.75

C211	Electronic Circuits II	2.23	1.77	1.13	0.8	-	-	-	-	-	0.8	-	0.8	1.77	1.43
C212	Communication Theory	2.30	1.53	1.53	1.53	1.53	1.53	-	-	-	-	0.77	1.53	0.77	1.53
C213	Electromagnetic Fields	1.67	0.83	0.83	-	0.83	-	-	-	-	-	-	0.83	0.83	0.83
C214	Linear Integrated Circuits	2.50	0.83	0.83	-	0.83	-	-	-	-	-	-	-	0.83	1.67
C215	Environmental Science and Engineering	1.00	0.87	0.50	-	-	0.70	2.10	0.87	-	-	-	0.70	-	-
C216	Circuits Design and Simulation Laboratory	2.50	1.67	1.33	0.83	1.17	-	0.83	0.83	0.83	0.83	-	0.83	2.50	1.33
C217	Linear Integrated Circuits Laboratory	2.60	1.67	1.17	0.83	1.00	-	-	1.73	0.83	0.83	1.67	0.83	2.17	1.17
C301	Digital Communication	0.60	0.60	0.27	-	-	-	-	-	0.27	-	-	0.53	0.27	0.53
C302	Discrete-Time Signal Processing	0.20	0.13	0.07	-	0.07	-	-	-	-	-	-	0.13	0.13	0.20
C303	Computer Architecture and Organization	0.70	0.53	0.57	0.33	-	0.57	0.70	0.57	-	0.33	0.57	0.23	0.57	0.47
C304	Communication Networks	1.93	1.13	0.80	0.00	-	-	-	1.60	-	0.80	-	1.60	1.60	1.60
C305	Medical Electronics	0.93	-	0.47	0.47	-	0.93	-	-	-	-	-	-	0.93	0.47
C306	Renewable Energy Sources	1.13	-	0.57	-	-	1.13	1.70	1.13	-	-	-	1.13	0.57	0.57
C307	Digital Signal Processing Laboratory	3.00	3.00	2.00	1.00	3.00	-	-	1.00	2.00	1.00	2.00	1.00	2.00	3.00
C308	Communication Systems Laboratory	2.00	1.67	1.00	1.67	-	-	-	1.73	0.83	0.83	1.67	2.00	1.67	2.17
C309	Networks Laboratory	2.60	1.40	1.20	0.00	2.00	-	-	1.00	2.00	2.00	-	2.00	2.00	1.00

C310 Micro Micro	oprocessors and ocontrollers	2.13	1.53	0.77	1.53	0.77	0.77	0.77	0.77	0.77	0.77	1.53	1.53	0.77	1.53
C311 VLSI	I Design	1.87	1.73	1.00	1.73	-	-	-	0.80	-	-	-	2.03	1.73	2.20
C312 Wire	less Communication	1.73	1.17	1.47	-	-	-	-	0.90	-	-	-	1.73	1.17	1.73
C313 Princ	ciples of Management	1.33	-	-	-	1.33	-	-	1.33	0.00	1.33	1.33	0.67	-	1.33
C314 Trans Syste	smission Lines and RF	1.97	1.37	1.20	0.72	-	-	-	-	-	-	-	0.77	1.37	1.80
C315 Wire	less Networks	2.50	1.67	1.67	1.67	1.67	1.67	-	-	-	-	0.83	1.67	1.67	1.67
C316 Micro Labo	oprocessors and ocontrollers oratory	2.00	2.00	1.00	1.00	2.00	-	-	1.00	2.00	1.00	1.00	2.00	2.00	2.00
C317 VLSI	I Design Laboratory	3.00	1.40	1.40	1.40	3.00	-	-	1.00	1.00	1.00	-	2.00	3.00	1.80
C318 Tech	nical Seminar	0.93	-	-	-	1.87	-	-	-	1.87	2.80	1.87	1.87	-	0.90
C401 Anter Engin	nnas and Microwave neering	1.67	1.20	0.90	0.67	-	0.77	0.77	-	-	-	-	0.77	0.90	1.67
C402 Optic	cal Communication	2.40	1.93	1.60	2.07	-	1.17	-	1.73	-	-	1.07	1.00	1.00	-
C403 Embe Syste	edded and Real Time	1.87	0.00	1.17	0.83	-	-	-	-	-	0.83	0.00	1.67	-	0.83
C404 Ad he Sense	oc and Wireless or Networks	1.87	1.67	1.17	0.83	0.83	0.00	-	-	-	0.83	0.00	1.67	-	2.70
C405 Trans	sducer Engineering	1.87	1.67	1.17	-	-	0.83	-	0.83	-	0.83	-	1.67	-	2.00
C406 Disas	ster Engineering	0.87	-	2.10	-	-	-	2.60	1.33	-	-	-	1.73	-	2.30
C407 Embe	edded Laboratory	3.00	1.40	1.40	1.40	3.00	-	-	1.00	1.00	1.00	-	2.00	3.00	3.00

C408	Advanced Communication Laboratory	2.50	1.83	1.50	1.33	1.50	1.33	-	0.87	0.83	1.67	0.83	1.67	1.00	2.50
C409	Professional Ethics in Engineering	0.80	-	-	-	-	1.60	1.21	2.40	1.56	0.80	1.56	2.40	-	1.60
C410	Satellite Communication	1.90	1.90	0.87	-	-	-	-	1.73	1.73	1.73	-	1.73	1.73	1.73
C411	Project Work	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83
	Average	1.69	1.24	0.99	1.02	1.59	1.00	1.20	1.16	1.40	1.29	1.34	1.34	1.28	1.37
1	Direct Attainment	2.13	2.03	2.17	2.22	2.56	1.95	2.20	2.46	2.71	2.46	2.35	2.25	2.10	2.12
Iı	ndirect Attainment	3.00	3.00	2.50	2.50	2.50	3.00	3.00	3.00	2.50	3.00	2.50	3.00	3.00	3.00
80%	of Direct Attainment	1.70	1.63	1.74	1.77	2.05	1.56	1.76	1.97	2.17	1.97	1.88	1.80	1.68	1.70
20%	of Indirect Attainment	0.60	0.60	0.50	0.50	0.50	0.60	0.60	0.60	0.50	0.60	0.50	0.60	0.60	0.60
	PO Attainment	2.30	2.23	2.24	2.27	2.55	2.16	2.36	2.57	2.67	2.57	2.38	2.40	2.28	2.30





# 6. Measures for continuous improvement



# FIG 6.1 – Contribution of CO in PO attainment and Continuous Improvement (Faculty Level)

# PO attainment and Continuous Improvement (Program Coordinator and Direct or Level)

Category	Outcome	Action Taken
Course related	PO attained	Include activities.
	highly	
	PO not attained	Identify concerned courses, plan for
	highly	immediate improvements, guide,
		Support and monitor its execution.
Activity related	Activities	Critical assessment, impact analysis to
	Conducted	be done and revise as per the need for
		improvements.

All PO's can be adequately addressed through the selection of core courses and their CO's. If assessment is in alignment with CO's, then the performance of the students indicates the CO attainment. These measurements provide the basis for continuous improvement in the quality of learning. The attainment at Course Level, Programme Level and Institutional Level ensures the quality assurance for the stake holders. All the attainment analysis is made to provide continuous improvement through either in course delivery, assessment and Curriculum.