USHA RAMA
COLLEGE OF ENGINEERING AND TECHNOLOGY
On NH16, Telaprolu, Near Gannavaram, Krishna Dist. – 521109
Ph.: 0866-2527558, www.usharama.edu.in
(An Autonomous Institute, Approved by AICTE, New Delhi, Permanently Affiliated to JNTUK, Kakinada)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

OUTCOME BASED EDUCATION

B.TECH (ECE) – UR20 REGULATION

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INSTITUTE VISION AND MISSION

VISION:

To emerge as a **centre of excellence** in technical education by imparting **quality teaching learning practices** and **research for the transformation of society**

MISSION:

1. Provide an ideal and the best class infrastructure to foster exploration in engineering and research.
2. Build dedicated faculty with student centric teaching, incorporating experiential, innovative skills.
3. Encourage life-long learning, entrepreneurial thinking, and ethical responsibility in students to address societal challenges.
4. Imbibe values and encourage in activities for over-all personality development of the students.

DEPARTMENT VISION AND MISSION

VISION:

To be a pioneer in Electronics and Communication Engineering and research, promoting entrepreneurship and delivering innovative solutions to societal needs.

MISSION:

M1: To provide a strong foundation in Electronics and Communication Engineering, preparing students to tackle emerging technological challenges.

M2: To drive research in Electronics and Communication Engineering that delivers innovative solutions to societal needs.

M3: To promote lifelong learning, empowering students to adapt to the evolving technological advancements.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

The graduates of the programme are able to

PEO 1: Exhibit continuous growth in technical expertise and leadership within the engineering field, while upholding professional ethics.

PEO2: Communicate effectively and manage resources skillfully as members and leaders of the profession

PEO3: Commit to continuous learning and adapt to emerging technologies to meet the evolving needs of society

PROGRAM OUTCOMES (POs):

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Develop Electronic and Communication systems in VLSI, Embedded systems, Signal processing and RF communications using advanced tools

PSO2: Apply ECE knowledge to design, develop and test systems considering societal, environmental, ethical and economic factors

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

This Manual is a reference to help faculty, staff and stakeholders to understand the Outcome Based Education (OBE) system implemented at Usha Rama College of Engineering and Technology. The manual serves as valuable guidelines for the faculty to develop an assessment plan in the process to measure the outcome of the students during their course of study and also after their graduation. The manual outlines the process involved in developing a constructive curriculum development and content delivery or teaching plan.

OUTCOME BASED EDUCATION (OBE)

Outcome-Based Education (OBE) model is being adopted at a fast pace at Engineering colleges in India at the moment. It is considered as a giant leap forward to improve technical education in India and help Indian Engineers compete with their global counterparts. Outcome Based Education (OBE) is an important demonstration Tool for student-centred instruction that focuses on measuring student performance through outcomes.

Quality assurance and improvement process is about determining whether the set educational objectives meet a general standard of quality. Emphasis of outcome-based education (OBE) system is on quantifying what the students are capable of doing and learning outcomes of the students is one of the key components. Course Outcomes are the statements indicating knowledge and skills the student is expected to acquire at the end of a course. Program outcomes represent the knowledge, skills and attitudes the students should have at the end of program. Program outcomes can be directly measured through course outcomes. The outcome-based education model is based on defining various parameters called as Graduates Attributes (POs).

ABBREVIATIONS:

OBE	Outcome Based Education	BTL	Bloom's Taxonomy Level
LOT	Lower Order of Thinking	HOT	Higher Order of Thinking
PEO	Program Educational Objectives	PO	Program Outcome
CO	Course Outcome	PSO	Program Specific Outcome
CE	Course Exit Survey	HoD	Head of Department
PC	Program Coordinator	DAC	Department Advisory Committee
PAC	Program Assessment Committee	AY	Academic Year

OBE enhances the traditional methods and focuses on what the Institute provides to students. It shows the success by making or demonstrating outcomes using statements "able to do" in favour of students. OBE provides clear standards for observable and measurable outcomes.

Accreditation Serves to Notify:

- Parents and prospective students that a program has met minimum standards.
- Faculty, HOD, Principal of a program's strengths and weaknesses and of ways to improve the programme.
- Employers that graduates are prepared to begin professional practice
- The public that graduates are aware of societal considerations.

Purpose of accreditation is NOT TO:

- Find faults with the institution but to assess the status-ante of the performance.
- Denigrate the working style of the institution and its programs but to provide a feedback on their strengths and weaknesses.
- Demarcate the boundaries of quality but to offer a sensitizing process for continuous improvement in quality provisions.
- Select only institutions of national excellence but to provide benchmarks of excellence and identification of good practices.

Benefits of Accreditation:

- Facilitates continuous Quality Improvement.
- Demonstrates accountability to the public.
- Improves staff morale.
- Recognizes the achievements/innovations.
- Facilitates information sharing.
- Priority in getting financial assistance helps the Institution to know its strengths, weaknesses and opportunities.
- Initiates Institutions into innovative and modern methods of pedagogy
- Promotes intra and inter-Institutional interactions

Pre 2013 Scenario:

- Educational quality measurements focused on inputs, activities and outputs, such as resources used, classes taught, articles published, placements and graduate enrolments

- Such performance indicators provide no measurement of the degree to which Institutions of higher learning actually develop the knowledge and skills of their students.
- These measurements are ill-suited to inform governments, students and the general public about teaching and learning quality
- In the absence of comparable learning outcomes assessment across institutions, ratings and rankings are widely used as proxies for relative educational quality.
- NBA criteria were mainly input-process-output related and there were no direct measures of quality of learning.

WASHINGTON ACCORD:

It recognizes the substantial equivalency of programs accredited by those bodies and recommends that graduates of programs accredited by any of the signatory bodies be recognized by the other bodies as having met the academic requirements for entry to the practice of engineering.

The induction of India in the Washington Accord in 2014 with the permanent signatory status of The National Board of Accreditation (NBA) is considered a big leap forward for the higher education system in India. It means that an Engineering graduate from India can be employed in any one of the other countries who have signed the accord. For Indian Engineering Institutions to get accredited by NBA according to the pacts of the accord, it is compulsory that engineering institutions follow the Outcome Based Education (OBE) model. So, for an Engineering Institution to be accredited by NBA it should compulsorily follow the OBE model. Similarly, NAAC is also now following the same path and OBE is benchmarked as a standard for accreditation.

What are Outcomes?

- An outcome of an education is what the student should be able to do at the end of a program/ course/ instructional unit.
- Outcome-based education is an approach to education in which decisions about the curriculum are driven by the exit learning outcomes that the students should display at the end of the program/ course.
- Outcomes are the abilities the students acquire at the end of the program
- In outcome-based education, "product defines process".
- It is the results-oriented thinking and is the opposite of input-based education where the emphasis is on the educational process and where we are happy to accept whatever is the result.
- Outcome-based education is not simply producing outcomes for an existing curriculum.

A learning outcomes answers the question: "What is it that your students should be able to do at the end of the hour/lecture that they could not do before?". It pr0ovides a clear guidance for the planning and development of the teaching process, including the design and organization of materials, the selection of the most appropriate teaching methods, as well as providing a measure for quality assurance (Biggs, 2003).

Some important aspects of the Outcome Based Education:

1. **Course** is defined as a theory, practical or theory cum practical subject studied in a semester. For example Engineering Mathematics
2. **Course Outcome (CO)** Course outcomes are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage.
3. **Program** is defined as the specialization or discipline of a Degree. It is the interconnected arrangement of courses, co-curricular and extracurricular activities to accomplish predetermined objectives leading to the awarding of a degree. For Example: B.E., Marine Engineering.
4. **Program Outcomes (POs)** Program outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.
5. **Program Educational Objectives (PEOs)** The Program Educational Objectives of a program are 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.
6. **Program Specific Outcomes (PSO)** Program 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 program.

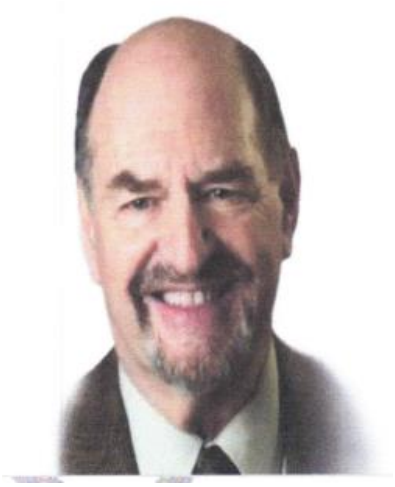
All OBE approaches take a criterion-based view of assessment and focus on what students can do with knowledge after a period of learning

LEVELS OF OUTCOMES:

- **Program Educational Objectives:** PEOs are broad statements that describe the career and professional accomplishments in five years after graduation that the program is preparing graduates to achieve.
- **Program Specific Outcomes:** PSOs are statements that describe what the graduates of a specific engineering program should be able to do.

- **Program Outcomes:** POs are statements that describe what the students graduating from engineering programs should be able to do.
- **Course Outcomes:** COs are statements that describe what students should be able to do at the end of a course. The method of assessment of the candidates during the program is left for the institution to decide. The various assessment tools for measuring Course Outcomes include Mid -Semester and End Semester Examinations, Tutorials, Assignments, Project work, Labs, Presentations, Employer/Alumni Feedback etc…

FOUR PRINCIPLES IN OBE:



Dr. William Spady is considered as the father of OBE.

The most widely used one is the four principles suggested by Dr. William Spady in the year 1994.

CLARITY OF FOCUS:

Clarity of focus, meaning that all activities (teaching, assessment, etc) are geared towards what we want students to demonstrate;

DESIGNING DOWN:

Design down, meaning designing the curriculum from the point at which you want students to end up.

HIGH EXPECTATIONS:

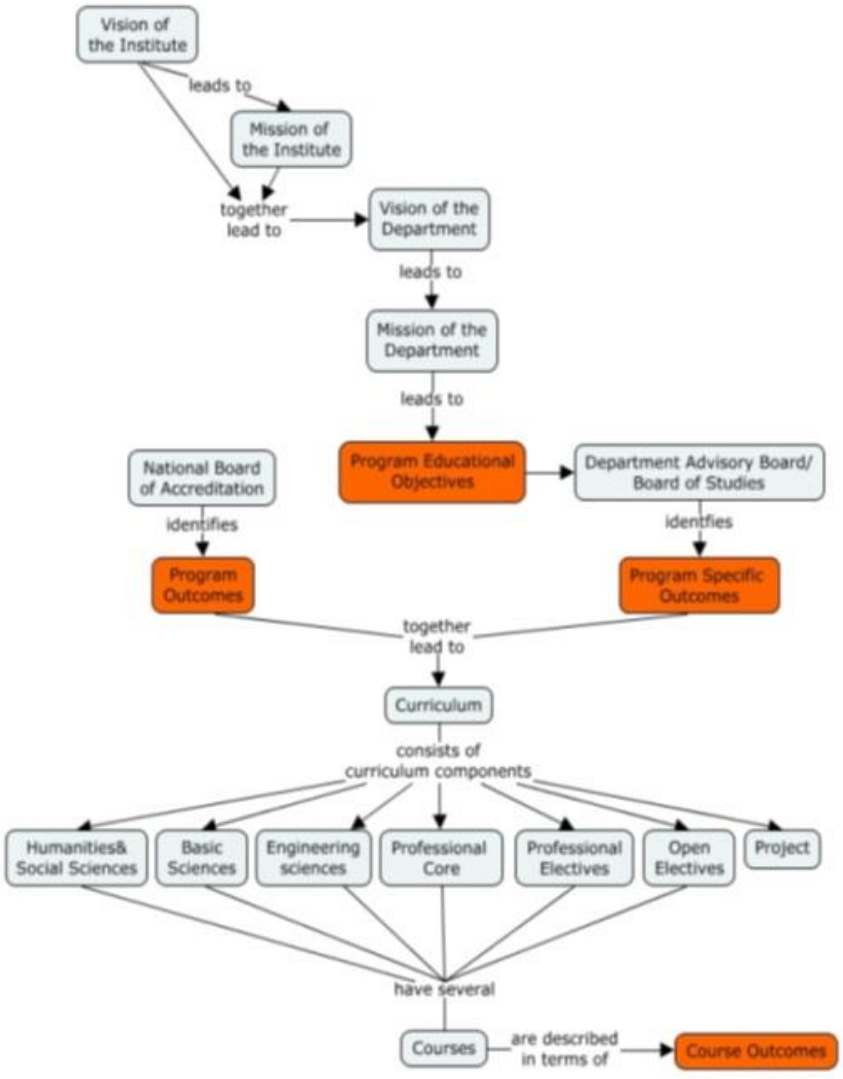
- Establish high, challenging performance standards.
- Engage deeply with issues are learning.

EXPANDED OPPORTUNITES:

- All students can be successful. Its only that they may require different instructional strategies.
- Additional learning opportunities in order to do so.

THE ESSENTIALS OF OBE:

- In OBE, what matters ultimately is not what is taught, but what is learned.
- Teachers must set appropriate course intended learning outcomes, instead of teaching objectives.
- Constructive alignment: What we teach, how we teach and how we assess ought to be aligned with the intended learning outcomes, such that they are fully consistent with each other.
- The quality of teaching is to be judged by the quality of learning that takes place;



Outcomes and Objectives in NBA framework

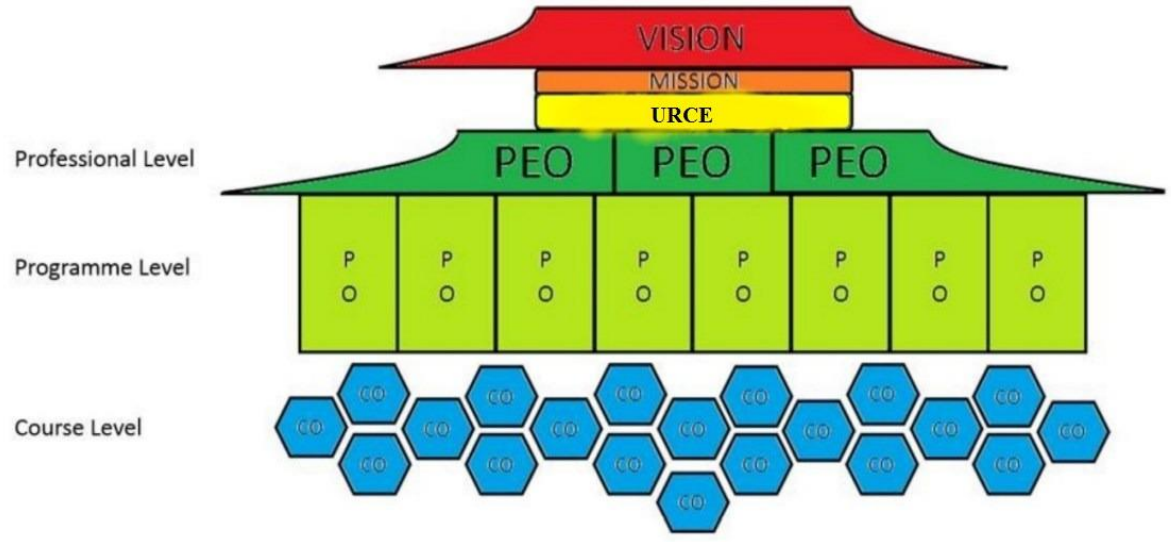
PROGRAM OUTCOMES (POs) are descriptions of the qualities, skills, abilities and understandings, an institutional community agrees that its students should develop as a consequence of the learning they engage with the program of study in that institution. POs indicate what students are expected to know and be able to do by the time they graduate from the institution. POs are not directly connected to any specific academic disciplines.

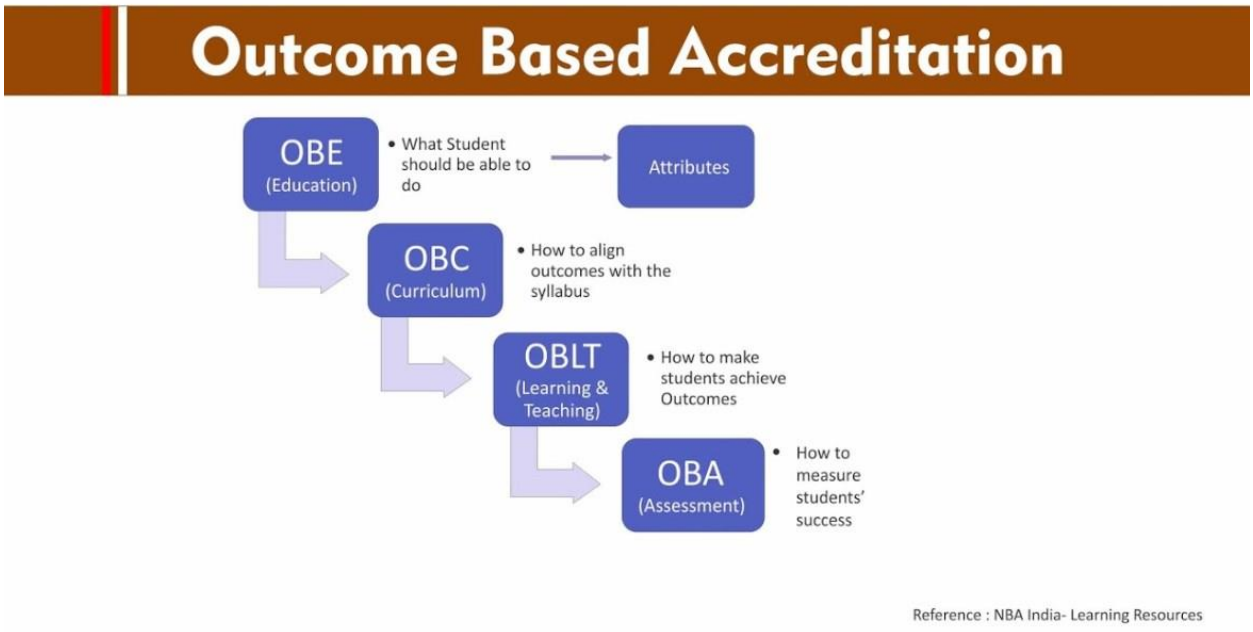
Students join an institution from different backgrounds, cultures and experiences. While studying at the institution, we want them to broaden their horizon and attitudes, and to develop their current skills and abilities and learn new ones. This is expected not only to help them in their studies and future careers, but also to support their role within society. POs also reflect the Vision, Mission and Core Values of the institution.

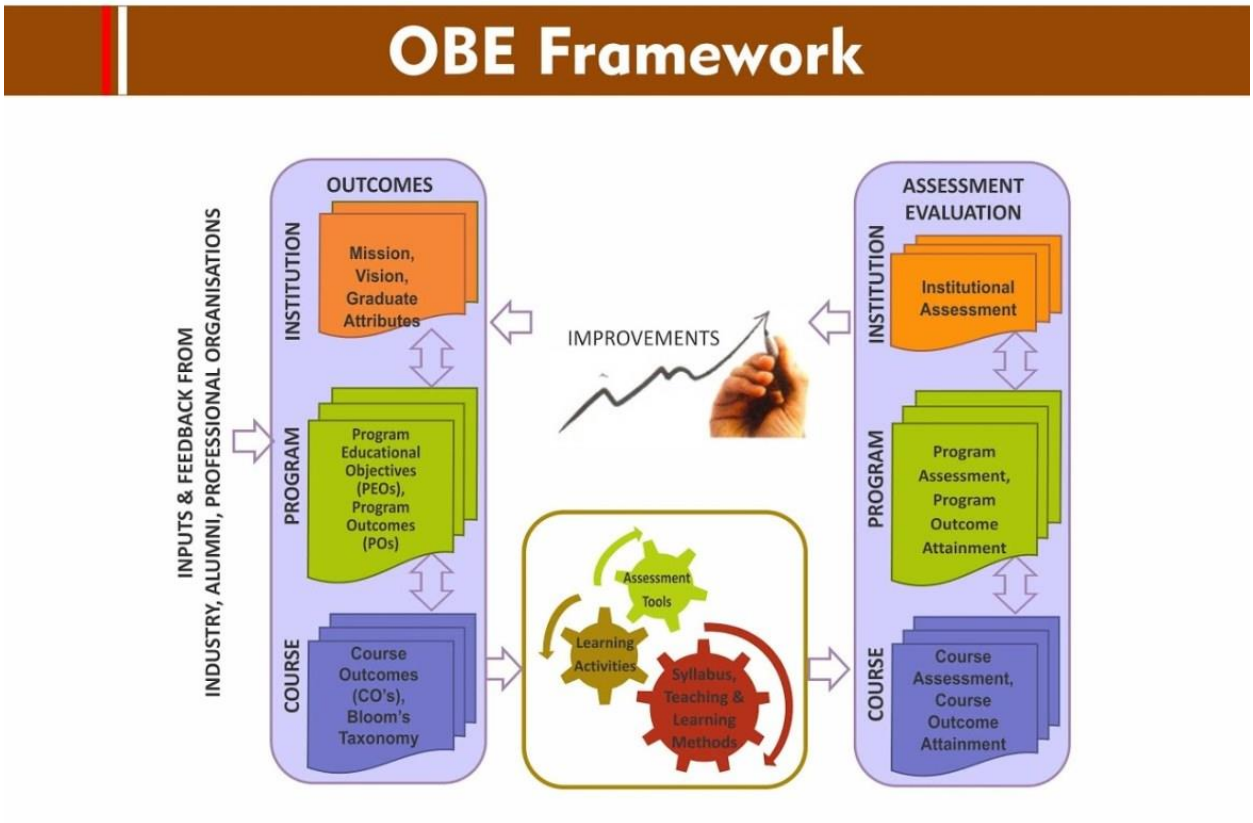
POs are not simply taught but developed through meaningful experiences and the processes of learning and reflection. They are unique to every student, yet might be able to identify some common areas that the institution wants their students to develop. Students will have their own starting points, progress and experiences in these areas while at the institution which will shape them as individuals.

1. Engineering Knowledge
2. Problem Analysis
3. Design and Development of Solutions
4. Conduct Investigations on Complex Problems
5. Engineering Tool Usage
6. The Engineer and the World
7. Ethics
8. Individual and Collaborative Team Work
9. Communication
10. Project Management and Finance
11. Life-Long Learning

PROGRAM SPECIFIC OUTCOMES (PSOs): PSOs are statements that describe what the graduates of a specific engineering program should be able to do.







TRADITIONAL VS THE OUTCOME-BASED APPROACH:

The traditional way of teaching was where the teacher instructs the students and the students generally take down the notes without even logical thinking. The important thing regarding teaching in the traditional method is that topic is written on the blackboard and students take down notes from the blackboard as a result at the end of the day the students memorize the same and appear for the examination with the at most intention to pass the Examination. With the recent advancement, there is no point in adhering to the Traditional method as the competition towards has increased enormously.

Outcome based education is seen a paradigm shift in the higher education that is student focused and outcome orientated. The table below provides a comparison of the traditional teaching approach and the outcome-based approach.

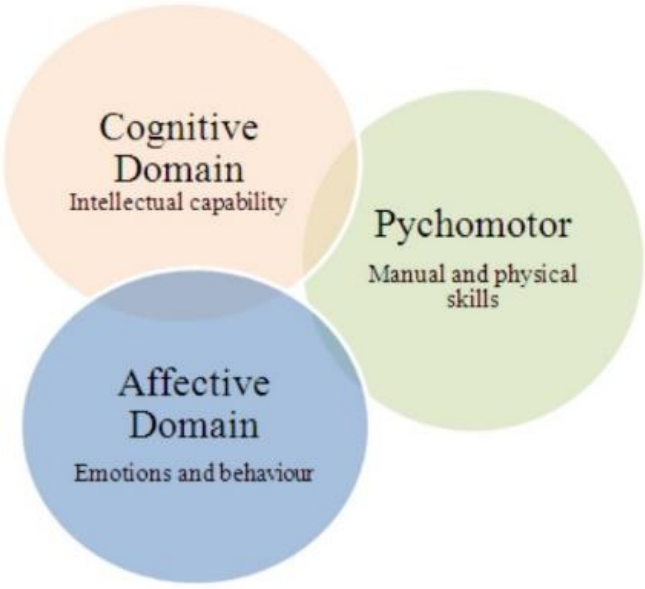
Outcome-Based Approach	Traditional Teaching Approach
Learner/student-centered	Teacher-centered
Teacher's role as partner/facilitator	Teacher's role as instructor
Focus on learner's output	Focus on teacher's input
Flexible and empowering	Rigid and controlling
Emphasis on progress and overall learning	Emphasis on products
Learning outcomes/Learning programmes are seen as guides that allows teachers to be innovation and creative in achieving learning outcomes	Course objectives/Syllabus is seen rigid & non negotiable
Criterion-reference assessment	Norm-referenced assessment
Ability building and skills development	Content-based and content delivery

ADMINISTRATIVE SYSTEM FOR OBE:

BLOOM'S TAXANOMY:

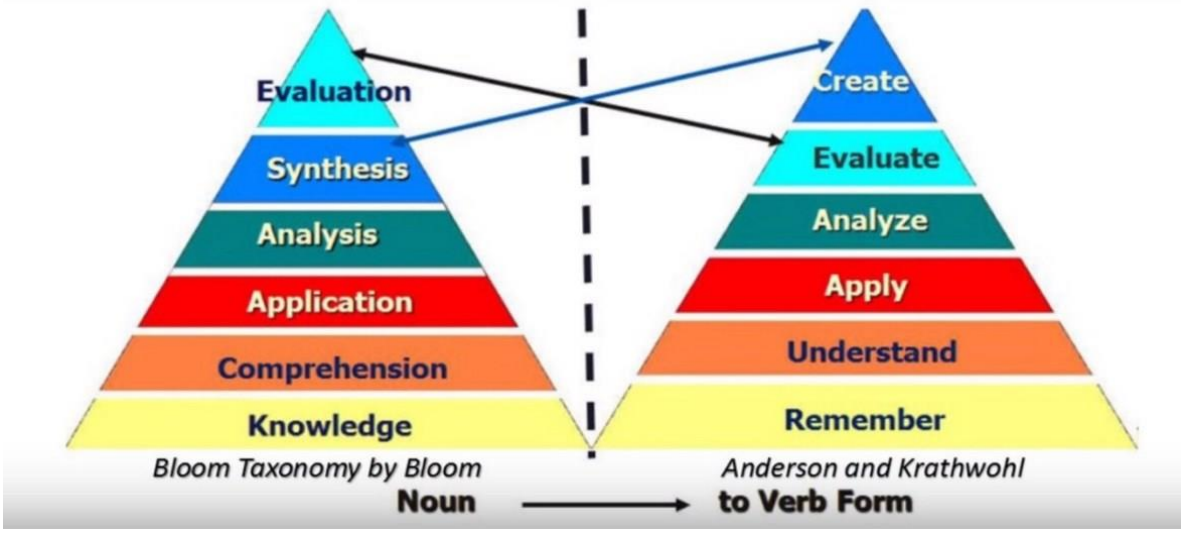
Bloom's Taxonomy provides an important framework to not only design curriculum and teaching methodologies but also to design appropriate examination questions belonging to various cognitive levels. Bloom's Taxonomy of Educational Objectives developed in 1956 by Benjamin Bloom was widely accepted by educators for curriculum design and assessment. In 2001, Anderson and Krathwohl modified Bloom's Taxonomy to make it relevant to the present-day requirements. It attempts to divide learning into three types of domains (cognitive, affective, and behavioural) and then defines the level of performance for each domain. Conscious efforts to map the curriculum and assessment to these levels can help the programs to aim for higher-

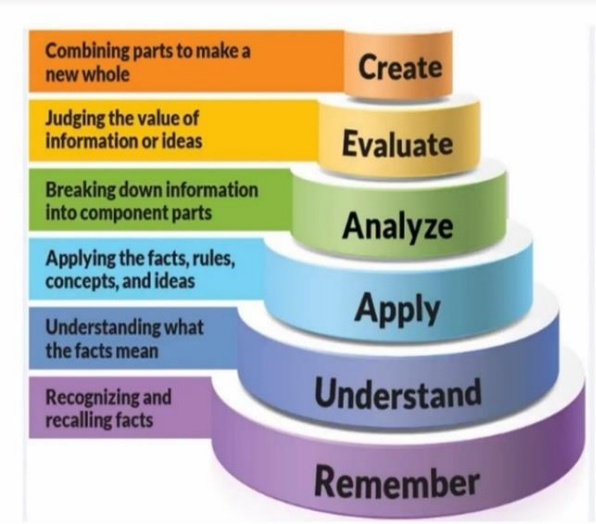
level abilities which go beyond remembering or understanding, and require application, analysis, evaluation or creation. Revised Bloom's taxonomy in the cognitive domain includes thinking, knowledge, and application of knowledge. It is a popular framework in engineering education to structure the assessment as it characterizes complexity and higher-order abilities. It identifies six levels of competencies within the cognitive domain as shown below which are appropriate for the purposes of engineering educators.



Learning Domains

The blooms taxonomy is shown in figure where the lower levels become foundation for the higher levels. The Bloom's taxonomy process is ordered in such a way that the lowest level is the simplest form of recognition, while the highest level built on lower levels involves more complex form of cognitive skill. By providing a hierarchy of levels, this taxonomy can assist teachers in designing assessment framework to measure the student's learning ability and making teaching method, innovative and adaptive to student's competencies and enhancing the same.





- Developed to provide a common language for teachers to discuss and exchange learning and assessment methods.
- It is a hierarchical model used to classify educational learning objectives into levels of complexity and specificity

The cognitive process dimensions- categories					
Lower Order of Thinking (LOT)			Higher Order of Thinking (HOT)		
Remember	**Understand**	**Apply**	**Analyse**	**Evaluate**	**Create**
Recognizing (identifying) Recalling (retrieving)	Interpreting Illustrating Classifying Summarizing Inferring (concluding) Comparing Explaining	Executing Implementing	Differentiating Organizing Attributing	Checking (coordinating, detecting, testing, monitoring) Critiquing (judging)	Planning Generating Producing (constructing)

COURSE OUTCOME ASSESSMENT PROCESS

The Key aspects in Outcome-Based Education (OBE) are the assessment of Course Outcomes. At the initial stage of OBE implementation, the Course Outcomes (COs) for each course are defined based on the Program Outcomes (POs) and other requirements. At the end of each course, the COs need to be assessed and evaluated to check whether they have been attained or not.

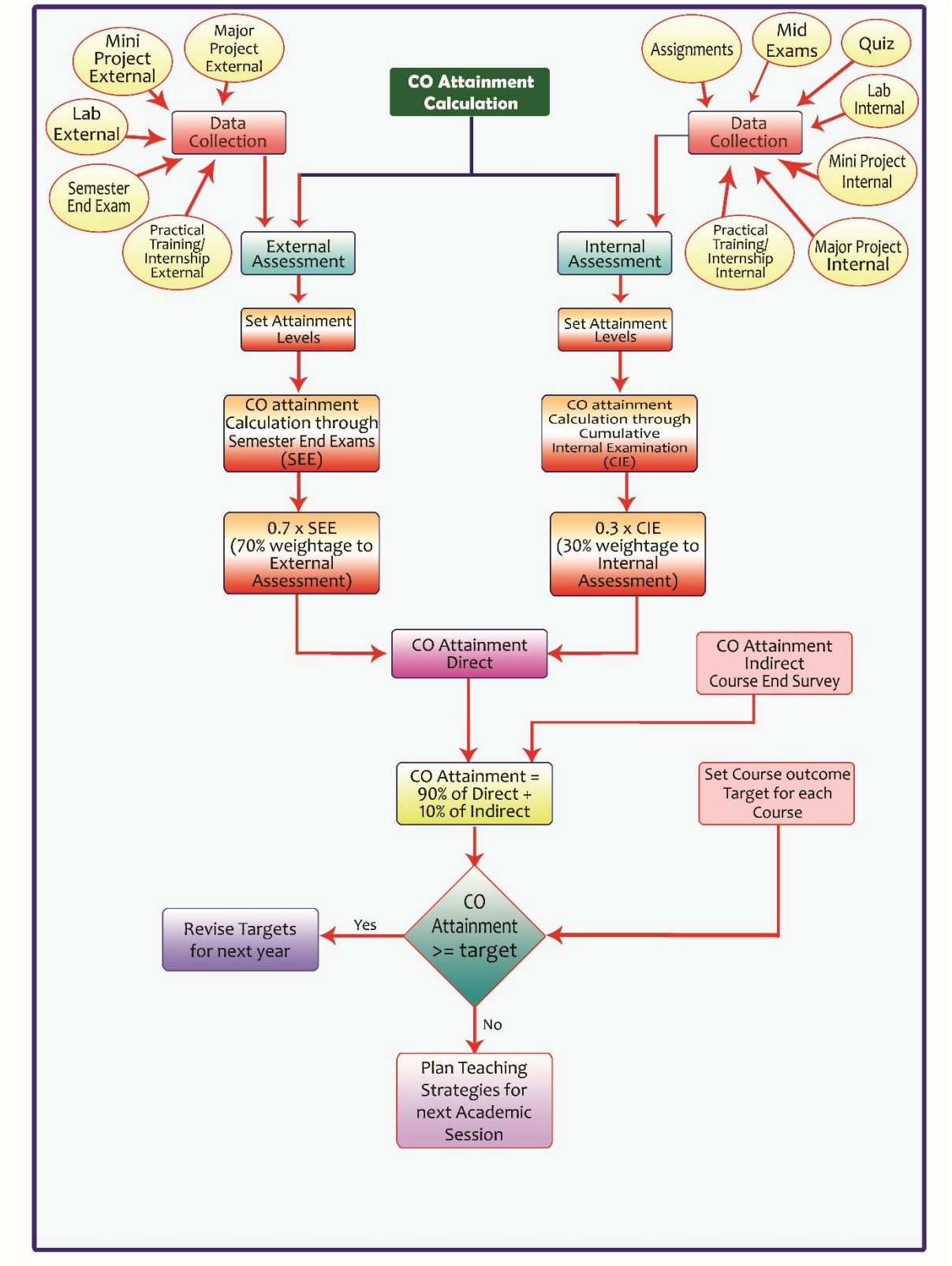
The process of attainment of COs, POs and PSOs starts from writing appropriate COs for each course of the program from first year to fourth year in a four-year engineering degree program. The course outcomes are written by the respective faculty member using action verbs of learning levels suggested by Bloom and Anderson. Then, a correlation is established between COs and POs in the scale of 1 to 3, 1 being the slight (low), 2 being moderate (medium) and 3 being substantial (high). A mapping matrix is prepared in this regard for every course in the program including the elective subjects. The course outcomes written and their mapping with POs are reviewed frequently by a committee of senior faculty members before they are finalized.

Assessment is one or more processes carried out by the department, which identify, collect and prepare data to evaluate the achievement of POs and Program Specific Outcomes (PSOs). Attainment is the action or fact of achieving a standard result towards accomplishment of desired goals. Primarily attainment is the standard of academic attainment as observed by examination results.

Course Outcomes (COs): Statements indicating what a student can do after the successful completion of a course. Every Course leads to some Course Outcomes. The CO statements are defined by considering the course content covered in each module of a course. For every course there may be 5 or 6 COs. The keywords used to define COs are based on Bloom's Taxonomy

Attainment of the COs can be measured directly and indirectly. Direct attainment displays the student's knowledge and skills from their performance. It can be determined from the performance of the students in all the relevant assessment instruments like internal assessments, assignments, quiz and final examinations. These methods provide a sampling of what students know and/or can do and provide strong evidence of student learning.

Indirect methods such as Course End Surveys ask the students to reflect on their learning. They access opinions or thoughts about the graduate's knowledge or skills. Indirect measures can provide information about graduate's perception of their learning and how this learning is valued by different stakeholders. The entire assessment process is depicted in the following Figure.



CO ATTAINMENT CALCULATION PROCESS

CO ATTAINMENT CALCULATION PROCESS:

For the evaluation and assessment of CO's and PO's, rubrics are used. Course Outcome is evaluated based on the performance of students in internal assessments and in End examination of a course. Internal assessment contributes 30% and End examinations assessment contributes 70% to the total attainment of a CO. After measuring CO attainment for a course, CO-PO mapping table will give Program Outcome attainment levels. The Program outcomes (PO's) are defined by NBA, New Delhi which are mandatory.

Program Outcomes (POs): 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 behaviours that students acquire as they progress through the program. Apart from the PO's every department has liberty to define its own Program Specific Outcomes (PSO's).

Program Specific Outcomes (Program has to specify 2 – 4 PSOs): Program Specific Outcomes are statements that describe what the graduates of a specific engineering program should be able to do.

PROCESS INVOLVED IN CO-PO MAPPING:

The role of CO-PO mapping will be assigned to the faculty as per hierarchy. After the course (subject) allotment from the department, the course in-charge of the course has to write appropriate COs for their corresponding course. It should be narrower and measurable statements. By using the action verbs of learning levels, CO's will be designed. CO statements should describe what the students are expected to know and able to do at the end of each course, which are related to the skills, knowledge and behaviour that students will acquire through the course.

After writing the CO statements, CO will be mapped with PO of the department. If the department is having more than one section in a year or the same course is available for more than one program of the same institute in a semester, the subject expert will be nominated as course coordinator of the corresponding course. The role of the course coordinator is to review the CO statements and the CO-PO mapping which has been done by course in-charge. The year wise coordinator has to consolidate the CO's of the respective year and maintain the documentation of the CO attainment level of the respective year courses as well as documentation of the individual students extra-curricular and co-curricular activities. These details will hand over to the program coordinator in order to evaluate PO attainment of the individual student as well as individual course at the end of the eighth semester. The Program coordinator has to evaluate the PO attainment of individual student through direct and indirect method after the student completing their program. All these works have to be done under the guidance of Department Advisory Committee (DAC).

Following are the different methods for Assessment, Evaluation and Measurement of POs/PSOs:

- **Direct Assessment methods**
- **Indirect Assessment methods**

DIRECT ASSESSMENT METHODS:

Continuous Assessment: COs are assessed through Sessional & Assignment Examinations and Lab records. The COs are mapped against each question and CO analysis is carried out by faculty for each course and documented. The contribution of COs are assessed in high, moderate and low levels, towards the attainment of POs/PSOs.

Semester-end Theory Examinations: The questions in semester-end examinations are tested pertaining to all COs, in varying Blooms Taxonomy Levels.

Laboratory Records: Both continuous and semester-end examinations are conducted to test the COs attainment.

INDIRECT ASSESSMENT METHODS:

Programme Exit survey: This survey taken from the final year students at the completion of their B.Tech programme, stands as the comprehensive feedback for the PO/PSO assessment

Alumni Survey: This survey is conducted annually through Google link or mail with the Alumni to obtain the inputs and suggestions on PO attainment in the real time societal environment

Employer Survey: This survey is taken from the employer to measure the PO attainments.

EXTERNAL EXAMINATION ASSESSMENT PROCESS:

NOTE:

Marks Range Theory (Max – 100)	Level	Letter Grade
≥ 90	Outstanding	A+
≥80 to <89	Excellent	A
≥70 to <79	Very Good	B
≥60 to <69	Good	C
≥50 to <59	Fair	D
≥40 to <49	Satisfactory	E
<40	Fail	F

RUBRICS:

If 50% of the students crossed D Grade: Attainment Level 1
If 60% of the students crossed D Grade : Attainment Level 2
If 70% of the students crossed D Grade: Attainment Level 3

External Examination Assessment for Laboratory subjects followed by the Rubrics

RUBRICS:

If 60% of the students crossed C Grade: Attainment Level 1
If 70% of the students crossed C Grade : Attainment Level 2
If 80% of the students crossed C Grade: Attainment Level 3

PROCEDURE:

1. Enter the question wise external marks.
2. Identify the CO of each question.
3. Calculate 50% of maximum marks of each question.
4. Find number of students crossed 50% of maximum marks for each question.
5. Find percentage of students crossed 50% of maximum marks for each question.
6. Find the attainment level of each question as per the above Rubrics.
7. Finally calculate CO attainment level by consolidating the question wise attainment levels.

INTERNAL EXAMINATION ASSESSMENT:

Internal Examination Assessment for Theory subjects followed by the Rubrics

RUBRICS:

If 50% of the students crossed 50% of the marks: Attainment Level 1
If 60% of the students crossed 50% of the marks: Attainment Level 2
If 70% of the students crossed 50% of the marks: Attainment Level 3

Internal Examination Assessment for Laboratory subjects followed by the Rubrics

RUBRICS:

If 60% of the students crossed 50% of the marks: Attainment Level 1
If 70% of the students crossed 50% of the marks: Attainment Level 2
If 80% of the students crossed 50% of the marks: Attainment Level 3

PROCEDURE:

1. Enter the question wise marks for mid examinations, assignments & quiz.
2. Identify the CO of each question.
3. Calculate the maximum marks of each CO based on mid exams, assignments and quiz.
4. Calculate the CO Wise marks obtained by each student.
5. Calculate 50% of maximum marks of each CO.
6. Find number of students crossed 50% of maximum marks for each CO.
7. Find percentage of students crossed 50% of maximum marks for each CO.
8. Find the attainment level of each CO as per the above Rubrics

CO ATTAINMENT:

CO Attainment using Direct Assessment:

Direct CO Attainment is calculated based on internal and external examinations.

Direct CO Attainment % = 30% of CIE + 70% of SEE.

CO Attainment using Indirect Assessment:

It is based on course end survey. A google form is created to take the course end survey at the end of each semester for Indirect Assessment.

Total CO Attainment:

CO Attainment % = 90% of Direct CO Attainment + 10% of Indirect CO Attainment.

EXAMPLE:

COURSE NAME:IMAGE PROCESSING

TARGET VALUE: 2.81

USHARAMA COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE OUTCOMES ASSESSMENT

FACULTY NAME: M.Ravi — ACADEMIC YEAR: 2023-24

COURSE : IP — Regulation : UR20

YEAR: IV — SEM: I

CO Direct Attainment				
CO's	COURSE OUTCOME	CO Attainment Level (Mid)	CO Attainment Level (External)	Direct CO Attainment Level
C414.1	Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization	2	3	2.7
C414.2	Demonstrate the knowledge of filtering techniques	2	3	2.7
C414.3	Demonstrate the knowledge of 2D transformation techniques	3	3	3
C414.4	Apply the knowledge of image enhancement and restoration	3	3	3
C414.5	Apply the knowledge of segmentation techniques.	3	3	3
C414.6	Apply image Compression techniques	2	3	2.7

CO Overall Attainment			
CO'S	Direct CO Attainment Level	Course Exit Survey (Indirect CO attainment level)	TOTAL ATTAINMENT LEVEL
C414.1	2.7	2.5	2.68
C414.2	2.7	2.4	2.67
C414.3	3	2.5	2.95
C414.4	3	2.4	2.94
C414.5	3	2.6	2.96
C414.6	2.7	2.5	2.68
OVERALL COURSE ATTAINMENT			2.81

For C414.1 CO Direct attainment Level is 2.7, indirect attainment level is 2.5.

Overall attainment = 90% Direct + 10% Indirect = 0.9 * 2.7 + 0.1 * 2.5

= 2.43 + 0.25 = 2.68

For C414.3 CO Direct attainment Level is 3, indirect attainment level is 2.5.

Overall attainment = 90% Direct + 10% Indirect = 0.9 * 3 + 0.1 * 2.5

= 2.7 + 0.25= 2.95

COURSE ASSESSMENT BASED ON INTERNAL MID EXAMINATIONS

USHARAMA COLLEGE OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
COURSE ASSESSMENT BASED ON INTERNAL MID EXAMINATIONS

FACULTY NAME:
COURSE :IP
YEAR: IV

ACADEMIC YEAR: 2023-24
Regulation : UR20
SEM:I

S.No	Roll. No	STUDENT NAME	Test	Descriptive-1			Descriptive-2			CO I	CO II	CO III	CO IV	CO V	CO VI	CO I	CO II	CO III	CO IV	CO V	CO VI	ASSIGNMENT-1	ASSIGNMENT-2	OBJECTIVE-1	OBJECTIVE-2
			Q.No	1	2	3	1	2	3							1	2	3	1	2	3				
				1.a	2.a	3.a	1.a	2.a	3.a	Max Marks	Max Marks	Max Marks	Max. Marks	Max Marks	Max. Marks	1	2	3	1	2	3				
			COs	I	II	III	IV	V	VI							I	II	III	IV	V	VI				
			Max. Marks	5.0	5.0	5.0	5.0	5.0	5.0	5	5	5	5	5	5	1.7	1.6	1.7	1.7	1.7	1.6	5	5	10	10
1	20NG1A0401	ABDUL NAFEEZUNNISA	30	1.0	3.0	5.0	5.0	5.0	5.0	1	3	5	5	5	5	1.7	1.6	1.7	1.7	1.7	1.6	5	5	10	10
2	20NG1A0402	ANGADALA CHARAN	30	1.0	0.0	4.0	2.0	5.0	5.0	1		4	2	5	5				0.68	0.7	0.64	A	2	7	3
3	20NG1A0403	BANDARU USHA SRI	30	3.0	5.0	5.0	5.0	5.0	5.0	3	5	5	5	5	5	1.7	1.6	1.7				5	5	9	10
4	20NG1A0404	BATTU RAJESH	30	3.0	1.0	4.0	1.0	4.0	2.0	3	1	4	1	4	2	0.68	0.6	0.7	1.02	1	0.96	2	3	6	9
5	20NG1A0405	BUSANABOYINA DURGA SAI TEJA	30	2.0	1.0	3.0	3.0	5.0	5.0	2	1	3	3	5	5	1.36	1.3	1.4	1.7	1.7	1.6	4	5	9	7
6	20NG1A0406	CHANDRAGIRI LAHARI PRIYANKA	30	3.0	4.0	5.0	5.0	5.0	5.0	3	4	5	5	5	5	1.7	1.6	1.7	1.7	1.7	1.6	5	5	10	10
7	20NG1A0407	CHINTHAPALLI MIHEER CHANDRA	30	4.0	0.0	4.0	1.0	3.0	3.0	4		4	1	3	3	1.36	1.3	1.4	1.02	1	0.96	4	3	5	8
8	20NG1A0408	DANDIBOINA HIMANJALI	30	5.0	2.0	5.0	4.0	4.0	5.0	5	2	5	4	4	5	1.7	1.6	1.7	1.7	1.7	1.6	5	5	8	7
9	20NG1A0409	DANDUBOYEENA ANURADHA	30	1.0	2.0	5.0	5.0	4.0	5.0	1	2	5	5	4	5	1.7	1.6	1.7	1.7	1.7	1.6	5	5	6	8
10	20NG1A0410	DERANGULA RAVI TEJA	30	3.0	0.0	1.0	4.0	3.0	1.0	3		1	4	3	1	0.34	0.3	0.3				1	A	7	8

The Attainment Levels as per the Bench Mark set for COs of all courses is 50% maximum marks for each CO

53	20NG1A0457	VAKA SAI KALYAN	30	1.0	0.0	0.0	3.0	2.0	2.0	1			3	2	2				1.02	1	0.96	A	3	3	9
54	20NG1A0458	VALAPALLI VAMSI KRISHNA	30	1.0	0.0	0.0	3.0	3.0	1.0	1			3	3	1	0.68	0.6	0.7	0.68	0.7	0.64	2	2		
55	20NG1A0459	VALLARAPU NAVEEN KUMAR	30	4.0	0.0	5.0	2.0	4.0	2.0	4		5	2	4	2	1.36	1.3	1.4	1.7	1.7	1.6	4	5	8	
56	20NG1A0460	VANKAMAMIDI PADMA PRANNATHI	30	1.0	5.0	3.0	5.0	5.0	2.0	1	5	3	5	5	2				1.7	1.7	1.6	A	5	8	
57	20NG1A0461	VARIGANJI RAKESH BABU	30	3.0	1.0	5.0	3.0	3.0	1.0	3	1	5	3	3	1				1.02	1	0.96	A	3		9
58	20NG1A0462	VELPULA BHARGAVI	30	2.0	5.0	5.0	4.0	4.0	3.0	2	5	5	4	4	3	1.36	1.3	1.4				4	5	9	7
59	20NG1A0463	YAVARNA PAVAN KUMAR	30				3.0	2.0	1.0				3	2	1				0.68	0.7	0.64	A	2	1	8
60	20NG1A0464	YENUGULA ESWAR	30	3.0	2.0	4.0	5.0	4.0	3.0	3	2	4	5	4	3				1.7	1.7	1.6	A	5	4	10
Total Number of Students Answered										57	40	52	52	54	53	47	47	47	48	48	48			58	51
50% of maximum marks										2.5	2.5	2.5	2.5	2.5	2.5	0.85	0.8	0.85	0.85	0.85	0.8			5	5
No. of Students crossed 50% of max. marks										29	22	41	37	47	29	34	34	34	40	40	40			54	48
% of students crossed 50% of max. marks										51	55	79	71	87	55	72	72	72	83	83	83			93	94
Attainment Level										1	1	3	3	3	1	3	3	3	3	3	3			3	3

FINAL INTERNAL CO ATTAINMENT

S.No	CO	ATTAINMENT LEVEL
1	C311.1	2
2	C311.2	2
3	C311.3	3
4	C311.4	3
5	C311.5	3
6	C311.6	2

Rubrics:	
If 50% of the students crossed 50% of maximum Marks: Attainment Level 1	
If 60% of the students crossed 50% of maximum Marks: Attainment Level 2	
If 70% of the students crossed 50% of maximum Marks: Attainment Level 3	

COURSE ASSESSMENT BASED ON EXTERNAL GRADES:

USHARAMA COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE ASSESSMENT BASED ON EXTERNAL MID EXAMINATIONS

FACULTY NAME: ACADEMIC YEAR: 2023-24

COURSE : IP Regulation : UR20

YEAR: IV/I SEM: I

S.No	Roll. No	NAME OF STUDENT	External Grade
1	20NG1A0401	ABDUL NAFEEZUNNISA	A
2	20NG1A0402	ANGADALA CHARAN	E
3	20NG1A0403	BANDARU USHA SRI	A
4	20NG1A0404	BATTU RAJESH	E
5	20NG1A0405	BUSANABOYINA DURGA SAI TEJA	D
6	20NG1A0406	CHANDRAGIRI LAHARI PRIYANKA	B
7	20NG1A0407	CHINTHAPALLI MIHEER CHANDRA	E
8	20NG1A0408	DANDIBOINA HIMANJALI	B
9	20NG1A0409	DANDUBOYEENA ANURADHA	A
10	20NG1A0410	DERANGULA RAVI TEJA	E
11	20NG1A0411	EDA SRI LAKSHMI PRASANNA	D
12	20NG1A0412	ELLA DEEPIKA	E
13	20NG1A0413	ELURI REVANTH RAJU	AB
14	20NG1A0414	GORIPARTHI KUSUMA DEVI	C
15	20NG1A0415	GUDEPU KIRAN MAHESH KUMAR	E
16	20NG1A0416	GUNTURI NAGA SURYA RAMYASRI	B
17	20NG1A0417	JAJULA NIKHITHA	D
18	20NG1A0418	KAGITHA VYSHALI	C
19	20NG1A0419	KALLEPALLI ANANYA	C
20	20NG1A0420	KAMISETTI HEMA MADHURI	D
21	20NG1A0421	KAMPASATI CHANDU	D
22	20NG1A0422	KANCHARLA NITHIN	E
23	20NG1A0423	KARNAM NAGA MOUNIKA DEVI	C
24	20NG1A0424	KARUMURI JYOTHI NIRMALA	E
25	20NG1A0425	KATARI MURALI KRISHNA	D
26	20NG1A0426	KAVITI SRAVYA SRI	B
27	20NG1A0427	KODALI BHARGAVI	C
28	20NG1A0428	KOMMINENI KEDHARNATH CHOWDARY	E
29	20NG1A0429	KOTARI NIKHIL	C
30	20NG1A0430	LANKALAPALLI SAI CHANDU	C
31	20NG1A0431	LAVU SAI PRATHYUSHA	B

NOTE:

Marks Range Theory (Max – 100)	Level	Letter Grade	Grade Point
≥ 90	Outstanding	A+	10
≥80 to <89	Excellent	A	9
≥70 to <79	Very Good	B	8
≥60 to <69	Good	C	7
≥50 to <59	Fair	D	6

Rubrics:

If 50% of the students crossed D Grade: Attainment Level 1

If 60% of the students crossed D Grade : Attainment Level 2

If 70% of the students crossed D Grade: Attainment Level 3

CO Attainment using Indirect Assessment:

It is based on course end survey. A feedback sheet is provided to collect feedback and conduct the program-end survey and assessment.

Department of ECE	
Subject Name	Image Processing
Subject Code	**UR20OECS704B**
Year and Sem	IV-I
Academic Year	2023-24
Faculty Name	M.Ravi

Course Outcomes	
CO1	Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization
CO2	Demonstrate the knowledge of filtering techniques.
CO3	Demonstrate the knowledge of 2D transformation techniques
CO4	Apply the knowledge of image enhancement and restoration
CO5	Apply the knowledge of segmentation techniques.
CO6	Apply image Compression techniques

S.No	Roll. No	Student Name	Course Outcomes					
			CO1	CO2	CO3	CO4	CO5	CO6
1	20NG1A0401	ABDUL NAFEEZUNNISA	5	5	5	5	5	5
2	20NG1A0402	ANGADALA CHARAN	5	4	5	4	5	4
3	20NG1A0403	BANDARU USHA SRI	4	4	4	4	4	4

4	20NG1A0404	BATTU RAJESH	4	3	4	3	5	3
5	20NG1A0405	BUSANABOYINA DURGA SAI TEJA	3	4	5	4	3	5
6	20NG1A0406	CHANDRAGIRI LAHARI PRIYANKA	5	5	5	5	5	5
7	20NG1A0407	CHINTHAPALLI MIHEER CHANDRA	4	4	4	4	4	4
8	20NG1A0408	DANDIBOINA HIMANJALI	3	3	3	3	3	3
9	20NG1A0409	DANDUBOYEENA ANURADHA	5	5	5	5	5	5
10	20NG1A0410	DERANGULA RAVI TEJA	5	4	5	4	5	4
11	20NG1A0411	EDA SRI LAKSHMI PRASANNA	4	4	4	4	4	4
12	20NG1A0412	ELLA DEEPIKA	4	3	4	3	5	3
13	20NG1A0413	ELURI REVANTH RAJU	4	4	4	4	4	4
14	20NG1A0414	GORIPARTHI KUSUMA DEVI	4	3	4	3	5	3
15	20NG1A0415	GUDEPU KIRAN MAHESH KUMAR	3	4	5	4	3	5
16	20NG1A0416	GUNTURI NAGA SURYA RAMYASRI	5	5	5	5	5	5
17	20NG1A0417	JAJULA NIKHITHA	4	4	4	4	4	4
18	20NG1A0418	KAGITHA VYSHALI	3	3	3	3	3	3
19	20NG1A0419	KALLEPALLI ANANYA	5	5	5	5	5	5
20	20NG1A0420	KAMISETTI HEMA MADHURI	5	4	5	4	5	4
21	20NG1A0421	KAMPASATI CHANDU	4	4	4	4	4	4
22	20NG1A0422	KANCHARLA NITHIN	4	3	4	3	5	3
23	20NG1A0423	KARNAM NAGA MOUNIKA DEVI	3	4	5	4	3	5
24	20NG1A0424	KARUMURI JYOTHI NIRMALA	5	5	5	5	5	5
25	20NG1A0425	KATARI MURALI KRISHNA	4	4	4	4	4	4
26	20NG1A0426	KAVITI SRAVYA SRI	3	3	3	3	3	3
27	20NG1A0427	KODALI BHARGAVI	5	5	5	5	5	5
28	20NG1A0428	KOMMINENI KEDHARNATH CHOWDARY	5	4	5	4	5	4
29	20NG1A0429	KOTARI NIKHIL	4	4	4	4	4	4
30	20NG1A0430	LANKALAPALLI SAI CHANDU	4	3	4	3	5	3
31	20NG1A0431	LAVU SAI PRATHYUSHA	3	4	4	4	3	5
32	20NG1A0432	MOMIN MOHAMMED HUSSAIN	5	5	4	5	5	5
33	20NG1A0433	MOTAPARTHI MOUNIKA	4	4	4	4	4	4
34	20NG1A0435	MUTHIKEPALLI SIVA REDDY	3	3	3	3	3	3

35	20NG1A0436	NANDURU ABHINAYA	5	5	5	5	5	5
36	20NG1A0437	NANDYALA VENKATA SIVA RAO	5	4	5	4	5	4
37	20NG1A0438	NERELLA TEJASWI	4	4	4	4	4	4
38	20NG1A0440	PAMARTHI HEMANTH KUMAR	4	3	4	3	5	3
39	20NG1A0441	PAMARTHI PRAVEEN KUMAR	3	4	5	4	3	5
40	20NG1A0442	PILLAMGOLLA NEELIMA SAI	5	5	5	5	5	5
41	20NG1A0443	PIRATI PAVANI	4	4	4	4	4	4
42	20NG1A0444	POKALA KAMAL SAI SRI LAKSHMI SRINIVAS	3	3	3	3	3	3
43	20NG1A0445	RAJULAPATI SASI KIRAN	5	5	4	5	5	5
44	20NG1A0446	RALLAPALLI YASWANTH VSATYA KRISHNA SAI	5	4	4	4	5	4
45	20NG1A0447	REDDY SYAMSUNDAR	4	4	4	4	4	4
46	20NG1A0448	SAMBANGI NIKHILA	4	3	4	3	5	3
47	20NG1A0450	SHAIK RAHEEMA BEGUM	3	4	5	4	3	5
48	20NG1A0451	SHAIK RIDHAA AHMED	5	5	5	5	5	5
49	20NG1A0452	SINGAVARAPU SAI SRAVANTH NAIDU	4	4	4	4	4	4
50	20NG1A0453	TEKI VINEELA	3	3	3	3	3	3
51	20NG1A0454	TELLA YASWITHA	5	5	4	5	5	5
52	20NG1A0456	VADLADI DEVI SRI MAHA LAKSHMI	5	4	4	4	5	4
53	20NG1A0457	VAKA SAI KALYAN	3	4	4	4	3	5
54	20NG1A0458	VALAPALLI VAMSI KRISHNA	5	5	4	5	5	5
55	20NG1A0459	VALLARAPU NAVEEN KUMAR	4	4	4	4	4	4
56	20NG1A0460	VANKAMAMIDI PADMA PRANNATHI	3	3	3	3	3	3
57	20NG1A0461	VARIGANJI RAKESH BABU	5	5	5	5	5	5
58	20NG1A0462	VELPULA BHARGAVI	5	4	4	4	5	4
59	20NG1A0463	YAVARNA PAVAN KUMAR	5	4	4	4	5	4
60	20NG1A0464	YENUGULA ESWAR	5	4	4	4	5	4
Number of students given feedback			60	60	60	60	60	60
Average on 5-point scale			4.18	4.02	4.23	4.02	4.30	4.13
Average on 3-point scale			2.51	2.41	2.54	2.41	2.58	2.48

Total CO Attainment:

CO Attainment % = 90% of Direct CO Attainment + 10% of Indirect CO Attainment.

USHARAMA COLLEGE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE OUTCOMES ASSESSMENT

FACULTY NAME: M.Ravi | ACADEMIC YEAR: 2023-24

COURSE : IP | Regulation : UR20

YEAR: IV | SEM: I

CO Direct Attainment

CO's	COURSE OUTCOME	CO Attainment Level (Mid)	CO Attainment Level (External)	Direct CO Attainment Level
C414.1	Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization	2	3	2.7
C414.2	Demonstrate the knowledge of filtering techniques	2	3	2.7
C414.3	Demonstrate the knowledge of 2D transformation techniques	3	3	3
C414.4	Apply the knowledge of image enhancement and restoration	3	3	3
C414.5	Apply the knowledge of segmentation techniques.	3	3	3
C414.6	Apply image Compression techniques	2	3	2.7

CO'S	Direct CO Attainment Level	Course Exit Survey (Indirect CO attainment level)	TOTAL ATTAINMENT LEVEL
C414.1	2.7	2.5	2.68
C414.2	2.7	2.4	2.67
C414.3	3	2.5	2.95
C414.4	3	2.4	2.94
C414.5	3	2.6	2.96
C414.6	2.7	2.5	2.68
OVERALL COURSE ATTAINMENT			2.81

Model Calculation:

For C414.1 CO Direct attainment Level is 2.7, indirect attainment level is 2.5.

Overall attainment = 90% Direct + 10% Indirect = 0.9 * 2.7 + 0.1 * 2.5

= 2.43 + 0.25 = 2.68

For C414.3 CO Direct attainment Level is 3, indirect attainment level is 2.5.

Overall attainment = 90% Direct + 10% Indirect = 0.9 * 3 + 0.1 * 2.5

= 2.7 + 0.25= 2.95

Course Articulation Matrix correlates the individual COs of a course with POs and PSOs. The Course Outcomes are mapped with POs and PSOs in the scale of 1 to 3.

The strength of correlation is indicated as 3 for **substantial (high)** 2 for correlation, **moderate (medium)** correlation, and 1 for **slight (low)** correlation.

A typical CO-PO mapping and CO-PSO mapping table is shown below.

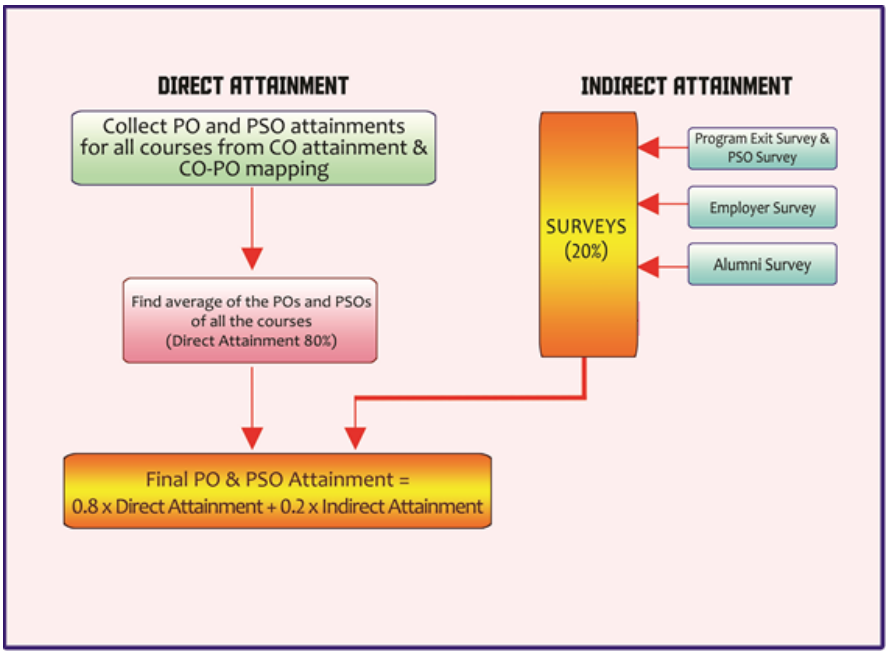
CO-PO MAPPING

CO'S	PO'S											PSO'S	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C322.1	3	1	3	3	3	3	2				3	3	1
C322.2	3	3	3	3	3	3	2				3	3	3
C322.3	3	3	3	3	3	3	2				1	3	1
C322.4	3	3	3	3	3	3	2				3	3	3
C322.5	3	3	3	3	3	3	3				3	3	3
C322.6	3	3	3	3	3	3	3				3	3	3

ATTAINMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

ASSESSMENT TOOLS & PROCESSES:

Programme outcome (PO) attainment process and Programme specific outcome (PSO) attainment process is done through direct and indirect assessment tools. 80% of direct attainment and 20% of indirect attainment is considered for calculation of PO attainment and PSO attainment. The PO and PSO Attainment process is diagrammatically shown in the below figure



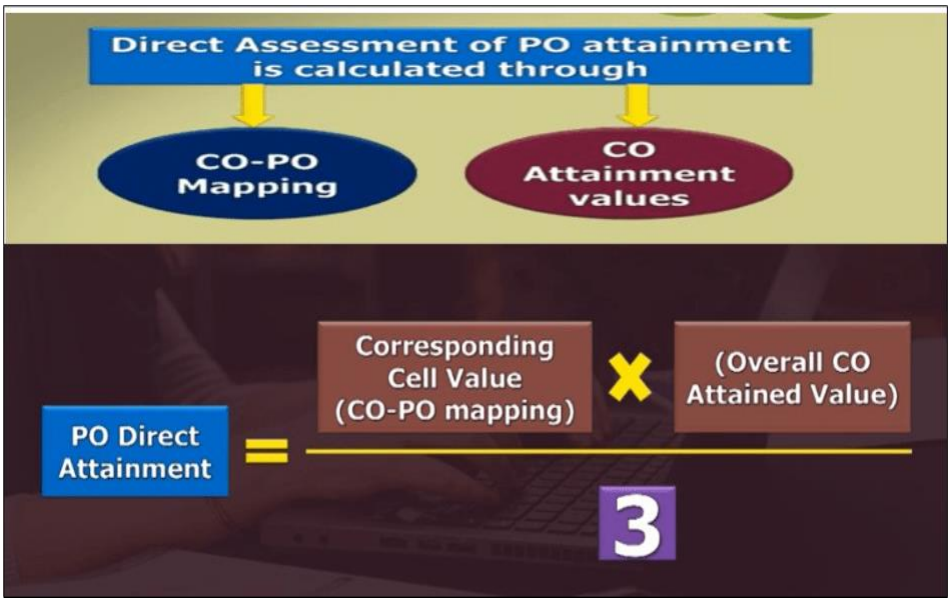
PO AND PSO ATTAINMENT PROCESS

Assessment tools and process used for evaluation of Program Outcomes and Program Specific Outcomes are presented below. Two different tools namely direct and indirect assessment tools are used.

DIRECT ASSESSMENT:

Direct assessment of programme outcomes and programme specific outcomes are based on the logical mapping of cognitive levels of course outcomes with programme outcomes and

programme specific outcomes and the following formula are used to calculate programme outcomes and program specific outcomes of the respective courses.



PO attainment is calculated with the following formula:

PO Attainment = POi * Total CO attainment Level / 3 where 'i' ranges from 1 to 12

Where POi is average of all COs correlated with the i^{th} PO.

Ex: **PO1 * Total CO attainment Level / 3**

PSO attainment is calculated with the following formula:

PSO Attainment = PSOi * Total CO attainment Level / 3 where 'i' ranges from 1 to 3

Where PSOi is average of all COs correlated with the i^{th} PSO.

Ex: **PSO1 * Total CO attainment Level / 3**

Program Outcome (PO) Assessment

CO Overall Attainment			
CO'S	**Direct CO Attainment Level**	**Course Exit Survey (Indirect CO attainment level)**	**TOTAL ATTAINMENT LEVEL**
C322.1	**3**	**2.5**	**2.95**
C322.2	**3**	**2.5**	**2.95**
C322.3	**3**	**2.5**	**2.95**
C322.4	**3**	**2.5**	**2.95**
C322.5	**3**	**2.5**	**2.95**
C322.6	**3**	**2.5**	**2.95**
OVERALL COURSE ATTAINMENT			**2.95**

CO-PO MAPPING

CO'S	PO'S											PSO'S	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C322.1	3	1	3	3	3	3	2				3	3	1
C322.2	3	3	3	3	3	3	2				3	3	3
C322.3	3	3	3	3	3	3	2				1	3	1
C322.4	3	3	3	3	3	3	2				3	3	3
C322.5	3	3	3	3	3	3	3				3	3	3
C322.6	3	3	3	3	3	3	3				3	3	3

CO'S	PO ATTAINMENT											PSO'S	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C322.1	2.95	0.98	2.95	2.95	2.95	2.95	1.97				2.95	2.95	0.98
C322.2	2.95	2.95	2.95	2.95	2.95	2.95	1.97				2.95	2.95	2.95
C322.3	2.95	2.95	2.95	2.95	2.95	2.95	1.97				0.98	2.95	0.98
C322.4	2.95	2.95	2.95	2.95	2.95	2.95	1.97				2.95	2.95	2.95
C322.5	2.95	2.95	2.95	2.95	2.95	2.95	2.95				2.95	2.95	2.95
C322.6	2.95	2.95	2.95	2.95	2.95	2.95	2.95				2.95	2.95	2.95
Overall Attainment	2.95	2.62	2.95	2.95	2.95	2.95	2.30				2.62	2.95	2.29

Overall attainment for PO2 will be = (0.98+2.95+2.95+2.95+2.95+2.95)/(6)

= 15.73/6

= 2.621 and it is rounded to 2.62

Overall attainment for PO7 will be = (1.97+1.97+1.97+1.97+2.95+2.95)/(6)

= 13.78/6

= 2.296 and it is rounded to 2.30

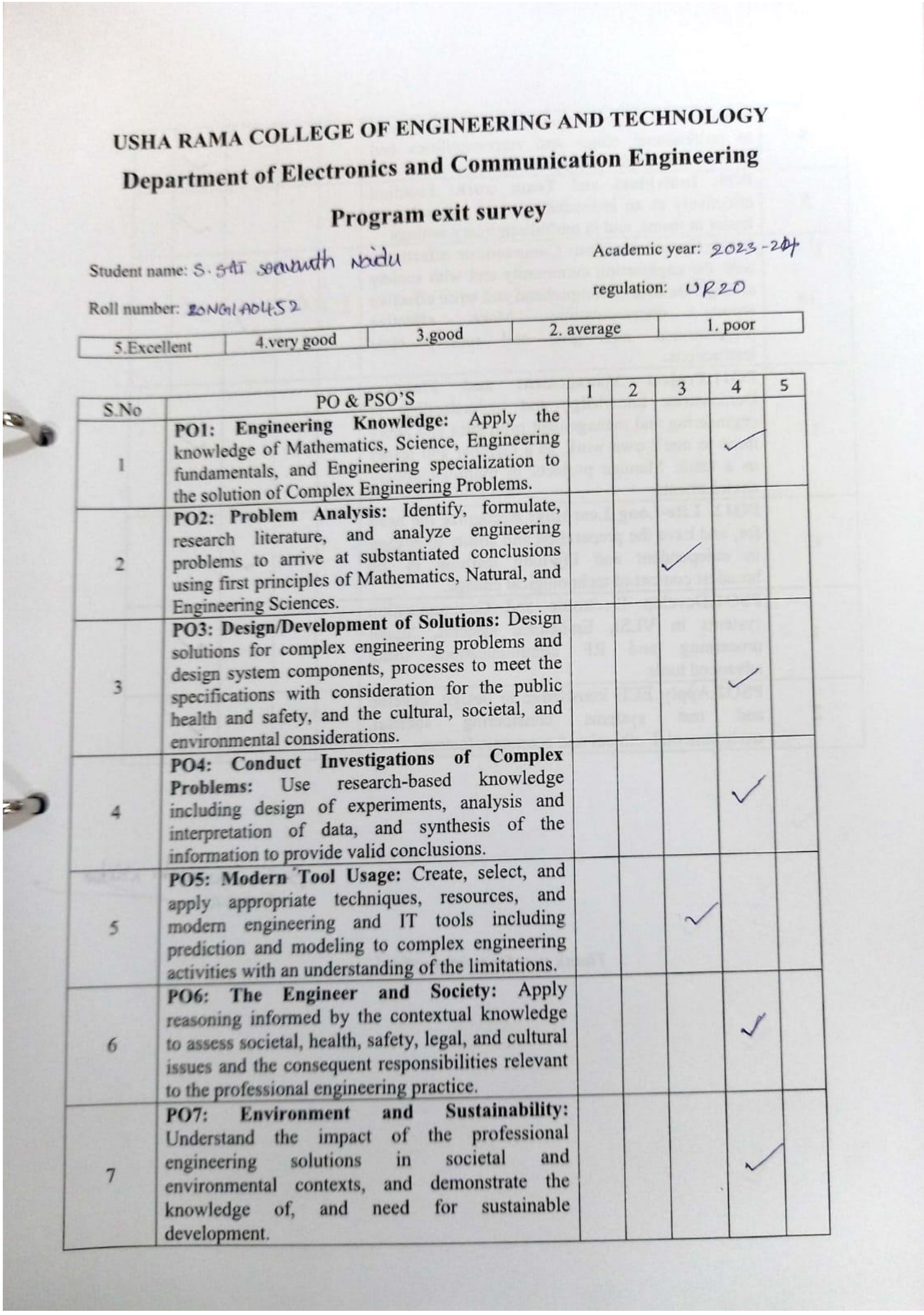
INDIRECT ASSESSMENT:

Indirect assessment is performed through the following surveys.

1. **Program Exit Survey.**
2. **Employer Survey.**
3. **Alumni Survey.**

Program Exit Survey.

A feedback sheet is provided to collect feedback and conduct the program-end survey and assessment.



USHA RAMA COLLEGE OF ENGINEERING AND TECHNOLOGY

Department of Electronics and Communication Engineering

Program exit survey

Student name: S. SAI saranath Naidu

Academic year: 2023-24

regulation: UR20

Roll number: 20NG1A0452

5.Excellent	4.very good	3.good	2. average	1. poor

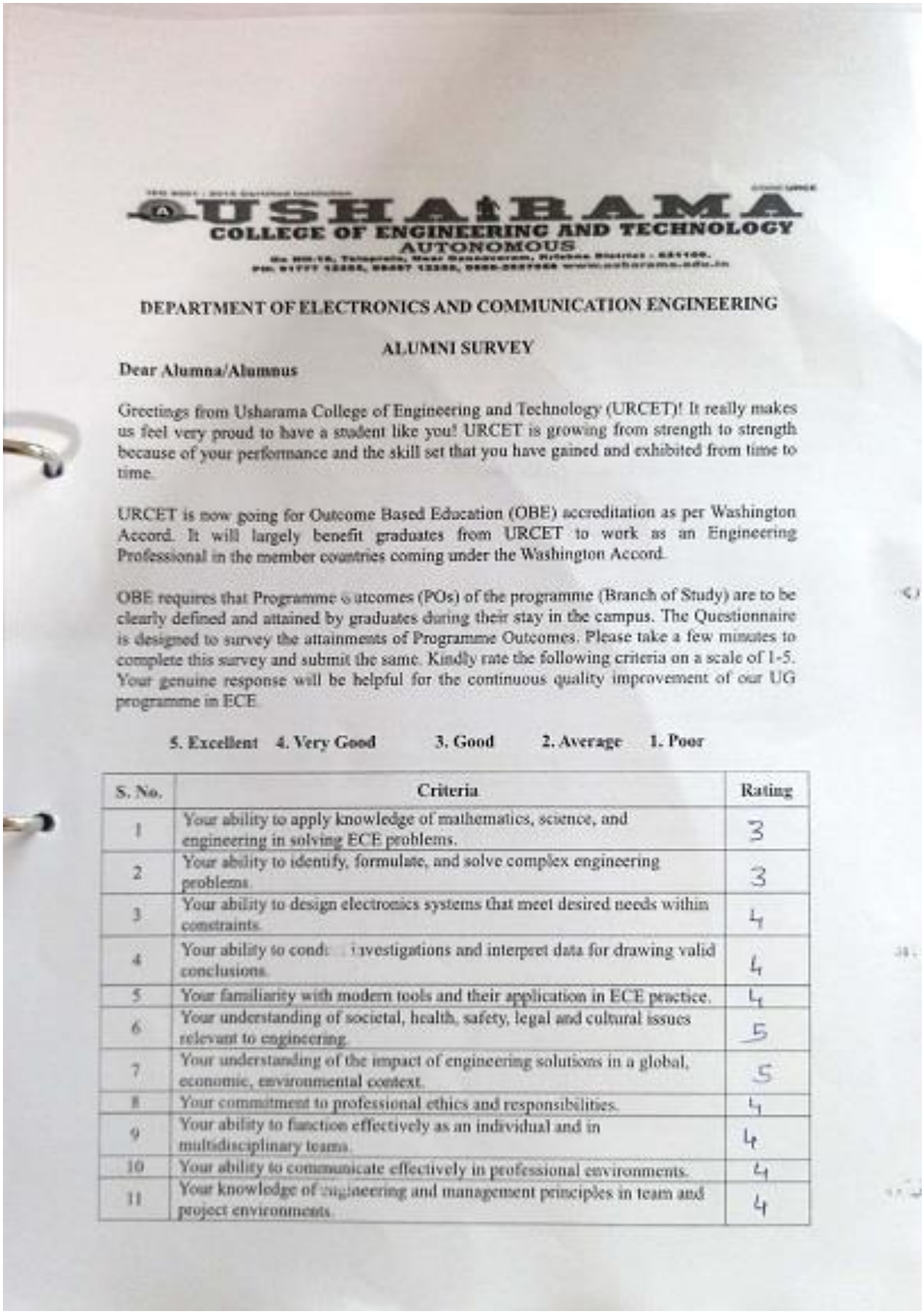
S.No	PO & PSO'S	1	2	3	4	5
1	**PO1: Engineering Knowledge:** Apply the knowledge of Mathematics, Science, Engineering fundamentals, and Engineering specialization to the solution of Complex Engineering Problems.				✓	
2	**PO2: Problem Analysis:** Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of Mathematics, Natural, and Engineering Sciences.			✓		
3	**PO3: Design/Development of Solutions:** Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations.				✓	
4	**PO4: Conduct Investigations of Complex Problems:** Use research-based knowledge 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 teams, and in multidisciplinary settings.				✓	
10	**PO10:Communication:** Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions.			✓		
11	**PO11:Project Management and Finance:** Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects 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.			✓		
1	**PSO1:**Develop Electronic and Communication systems in VLSI, Embedded systems, Signal processing and RF communications using advanced tools				✓	
2	**PSO2:**Apply ECE knowledge to design, develop and test systems considering societal, environmental, ethical and economic factors				✓	

S. Sai Saraath Naidu
Signature

Thank you for participating!

Alumni Survey:



USHARAMA
COLLEGE OF ENGINEERING AND TECHNOLOGY
AUTONOMOUS

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ALUMNI SURVEY

Dear Alumna/Alumnus

Greetings from Usharama College of Engineering and Technology (URCET)! It really makes us feel very proud to have a student like you! URCET is growing from strength to strength because of your performance and the skill set that you have gained and exhibited from time to time.

URCET is now going for Outcome Based Education (OBE) accreditation as per Washington Accord. It will largely benefit graduates from URCET to work as an Engineering Professional in the member countries coming under the Washington Accord.

OBE requires that Programme outcomes (POs) of the programme (Branch of Study) are to be clearly defined and attained by graduates during their stay in the campus. The Questionnaire is designed to survey the attainments of Programme Outcomes. Please take a few minutes to complete this survey and submit the same. Kindly rate the following criteria on a scale of 1-5. Your genuine response will be helpful for the continuous quality improvement of our UG programme in ECE.

5. Excellent 4. Very Good 3. Good 2. Average 1. Poor

S. No.	Criteria	Rating
1	Your ability to apply knowledge of mathematics, science, and engineering in solving ECE problems.	3
2	Your ability to identify, formulate, and solve complex engineering problems.	3
3	Your ability to design electronics systems that meet desired needs within constraints.	4
4	Your ability to conduct investigations and interpret data for drawing valid conclusions.	4
5	Your familiarity with modern tools and their application in ECE practice.	4
6	Your understanding of societal, health, safety, legal and cultural issues relevant to engineering.	5
7	Your understanding of the impact of engineering solutions in a global, economic, environmental context.	5
8	Your commitment to professional ethics and responsibilities.	4
9	Your ability to function effectively as an individual and in multidisciplinary teams.	4
10	Your ability to communicate effectively in professional environments.	4
11	Your knowledge of engineering and management principles in team and project environments.	4

12	Your ability to engage in lifelong learning and adapt to technological change.	4
13	Your ability to apply ECE knowledge to analyze and solve domain-specific problems.	4
14	Your ability to design and develop electronic systems using modern tools and techniques.	4

D. Naga Lakshmi
Signature

Name (in Capitals): D. NAGA LAKSHMI

B.Tech. Roll Number: 18NG1A04C2

Relation of POs and PSOs with questionnaire:

POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Questions	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14

Evaluation Process

The questionnaire consists of 14 questions which are relevant for assessing each PO and PSO. Each question is having 5 options namely Excellent, Very Good, Good, Average and Poor, which is given marks 5, 4, 3, 2, 1 respectively. These marks are to be tabulated and the average values corresponding to each PO and PSO are to be determined on a 3-point scale.

Employer Survey:

ISO 9001 : 2015 Certified Institution

USHARAMA

CODE:URCE

COLLEGE OF ENGINEERING AND TECHNOLOGY

AUTONOMOUS

On NH-16, Telaprolu, Near Gannavaram, Krishna District - 521109.
PH: 91777 12255, 99497 12255, 0866-2527558 www.usharama.edu.in

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EMPLOYER SURVEY

Employer Name: Spurthi.D
Company Name: Effetronics
Designation : HR Manager

Employer id: —
Contact Number: 9358421132
Email id: spurthi@effetronics.com

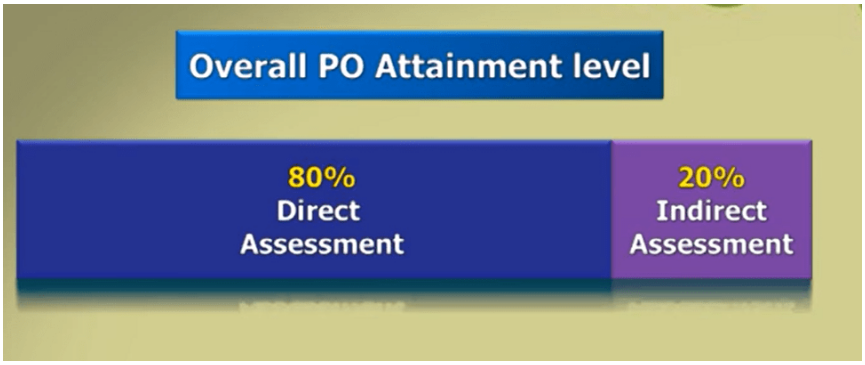
Kindly rate your observations on the following aspects of our graduate's performance

5. Excellent 4. Very Good 3. Good 2. Average 1. Poor

S. No.	Criteria	Rating
1	Ability to apply engineering and mathematical fundamentals in assigned tasks.	4
2	Effectiveness in analyzing technical problems and proposing suitable solutions.	4
3	Competence in designing systems or processes that meet project or client requirements.	4
4	Skill in conducting investigations and using data to support decisions.	4
5	Proficiency in selecting and using appropriate tools and technologies.	4
6	Awareness and consideration of societal, health, and safety aspects in work-related activities.	4
7	Understanding of the broader impacts of engineering solutions in a global and environmental context.	4
8	Adherence to ethical standards and professional responsibilities.	5
9	Collaboration and contribution within diverse or multidisciplinary teams.	4
10	Clarity and effectiveness in both verbal and written communication.	4
11	Capability to plan, manage, and execute tasks using managerial principles.	4
12	Willingness to learn and adapt to new technologies or trends.	4
13	Application of core ECE knowledge to practical engineering problems.	4
14	Involvement in designing and developing electronics systems using modern tools.	4

Signature

OVERALL LEVELS OF ATTAINMENT:



2020 Batch Indirect Attainment POs & PSOs

Indirect Attainment of POs and PSOs													
Assessment Tool	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
Program Exit Survey	2.32	2.33	2.45	2.47	2.34	2.44	2.55	2.41	2.34	2.42	2.49	2.47	2.50
Alumni Survey	2.25	2.31	2.40	2.36	2.21	2.52	2.51	2.45	2.39	2.38	2.41	2.36	2.49
Employer Survey	2.26	2.15	2.44	2.38	2.19	2.51	2.58	2.46	2.38	2.41	2.36	2.38	2.46
Final Average	**2.28**	**2.26**	**2.43**	**2.4**	**2.25**	**2.49**	**2.55**	**2.44**	**2.37**	**2.4**	**2.42**	**2.4**	**2.48**

Final Average= (Program Exit Survey+ Alumni Survey + Employer Survey)/3

Example : For PO1 , Final Average =(2.32+2.25+2.26)/3=2.28

2020 Batch Overall Attainment POs & PSOs

Indirect Attainment of POs and PSOs													
Assessment Tool	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
PO Direct Assessment (D)	2.66	2.34	2.30	2.13	2.34	2.05	2.03	2.32	2.34	2.33	2.24	2.60	2.50
PO Indirect Assessment (ID)	2.28	2.26	2.43	2.4	2.25	2.49	2.55	2.44	2.37	2.4	2.42	2.4	2.48
Overall Attainment (80% of (D) + 20% of (ID))	**2.58**	**2.32**	**2.33**	**2.18**	**2.32**	**2.14**	**2.13**	**2.34**	**2.35**	**2.34**	**2.28**	**2.56**	**2.50**

Overall Attainment of PO or PSO = (0.8 * D)+(0.2 *ID)

Example : For PO1, Final Attainment =(0.8*2.66)+(0.2*2.28)=2.58

Modal calculation for Overall PO attainment = **80% of Direct Assesment + 20% ofIndirect Assesment**

For PO1 Direct assessment value is 2.66, indirect assessment value is 2.28.

Overall attainment for PO 1 is = 0.8 * 2.66 + 0.2 * 2.28

= 2.128+ 0.456 = 2.584 and it is rounded to 2.58

For PO8 Direct assessment value is 2.32, indirect assessment value is 2.44.

Overall attainment for PO 1 is = 0.8 * 2.32 + 0.2 * 2.44

= 1.856 + 0.488= 2.344 and it is rounded to 2.34

Comparative Table for POs and PSOs attainment for the Last Three Batches

Batch	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
2020-2024 Batch	2.58	2.32	2.33	2.18	2.32	2.14	2.13	2.34	2.35	2.34	2.28	2.56	2.50
2019-2023 Batch	2.35	2.19	2.21	2.07	2.17	2.05	2.01	2.18	2.20	2.23	2.16	2.32	2.29
2018-2022 Batch	2.32	2.17	2.19	2.04	2.11	2.01	1.98	2.16	2.16	2.13	2.04	2.14	2.06

The eleven steps towards validation of POs are as follows:

Step 1: Defining the Vision and Mission of the Department.

Step 2: Defining Program Educational Objectives (PEOs) of the Department.

Step 3: Establishing POs to setup target level of PO attainment.

Step 4: Defining relation between Course Outcomes (COs) and POs for each course to obtain overall CO mapping with each POs.

Step 5: Development of overall CO-PO mapping matrix for all courses.

Step 6: Computation and construction of overall CO attainment matrix for each course using course assessment tools.

Step 7: Calculation and construction of direct PO attainment matrix using overall CO-PO mapping matrix and overall CO attainment matrix.

Step 8: Calculation of overall direct PO attainment.

Step 9: Calculation of indirect PO attainment.

Step 10: Computation of overall PO attainment.

Step 11: Comparison of target level and obtained PO attainment.

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Ph.: 0866-2527558, www.usharama.edu.in
(An Autonomous Institute, Approved by AICTE, New Delhi, Permanently Affiliated to JNTUK, Kakinada)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

List of Courses for UR20 Regulation and their Codes

CODE	COURSE	CODE	COURSE
I SEMESTER		**II SEMESTER**	
C111	Problem Solving and Programming using C	C121	Python Programming
C112	Applied Physics	C122	Applied Chemistry
C113	Basic Electrical Engineering	C123	Communicative English
C114	Linear Algebra & Calculus	C124	Differential Equations & Vector Calculus
C115	Electronic Workshop	C125	Engineering Graphics & Drafting
C116	Problem Solving and Programming using C Lab	C126	Python Programming Lab
C117	Applied Physics Lab	C127	Applied Chemistry Lab
C118	Basic Electrical Engineering Lab	C128	Communicative English Lab
III SEMESTER		**IV SEMESTER**	
C211	Numerical Methods and Transforms	C221	Linear control Systems
C212	Network Analysis	C222	Management Science
C213	Electronic Devices and Circuits	C223	Electronic Circuit Analysis
C214	Switching Theory and Logic Design	C224	Digital IC Design
C215	Signals and Systems	C225	Analog Communications
C216	Random Variables and Stochastic Processes	C226	Electronic Circuit Analysis Lab
C217	Electronic Devices and Circuits Lab	C227	Digital IC Design Lab
C218	Java Programming	C228	Analog Communications Lab
		C229	Soft Skills
		C2210	Community Service Project

V SEMESTER		VI SEMESTER	
C311	Linear Integrated Circuits and Applications	C321	Microprocessors and Microcontrollers
C312	Electromagnetic Waves and Transmission Lines	C322	VLSI Design
C313	Digital Communications	C323	Digital Signal Processing
C314	Electronic Measurements and Instrumentation	C324	Internet of Things
C315	Computer Organization and Architecture	C325	Computer Networks
C316	Linear Integrated Circuits and Applications Lab	C326	Microprocessor and Microcontrollers Lab
C317	Digital Communications Lab	C327	VLSI Design Lab
C318	Summer Internship	C328	Digital Signal Processing Lab
C319	Data Structures using JAVA	C329	ARM based/Aurdino based Programming/IoT
VII SEMESTER		**VIII SEMESTER**	
C411	Optical Communication	C421	Project
C412	Embedded Systems		
C413	Mobile & Cellular Communication		
C414	Image Processing		
C415	Introduction to Machine Learning		
C416	Universal Human Values-II: Understanding Harmony		
C417	Designer Tools		
C418	Industrial / Research Internship		