

**MANUAL  
FOR  
CO – PO / PSO ATTAINMENT  
AND  
ASSESSMENT  
PROCESS**



(Approved by AICTE, New Delhi | Affiliated to JNTUH, Hyderabad | Accredited by NAAC | Accredited by NBA | Hyderabad | PIN: 500068)

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## **1. INSTITUTE VISION AND MISSION**

### **VISION**

- To be a center of excellence in technical education to empower the young talent through quality education and innovative engineering for well-being of the society.

### **MISSION**

- Provide quality education with innovative methodology and Intellectual human capital.
- Provide conducive environment for research and developmental activities.
- Inculcate holistic approach towards nature, society and human ethics with lifelong learning attitude.

## **2. DEPARTMENTS VISION AND MISSION**

### **ELECTRONICS AND COMMUNICATION ENGINEERING**

#### **VISION**

- To excel in Electronics & Communication Engineering education with the knowledge of innovation, research and ethics.

#### **MISSION**

- To provide academic environment that promotes student centric learning through quality education and state of the art infrastructure.
- To make the students aspire towards innovation and research to meet the technological needs of society.
- To engage the students in activities which inculcate professional practices with social concern.

### **COMPUTER SCIENCE ENGINEERING**

#### **VISION**

- To excel in computer science engineering education with best learning practices, research and professional ethics.

#### **MISSION**

- To offer technical education with innovative teaching, good infrastructure and qualified human resources.
- Accomplish a process to advance knowledge in the subject and promote academic and research environment.
- To impart moral and ethical values and interpersonal skills to the students.

## **CIVIL ENGINEERING**

### **VISION**

- To impart knowledge and excellence in civil engineering and technology with global perspectives to our students and to make them ethically strong engineers to build our nation.

### **MISION**

- To produce civil engineers of high calibre, technical skills and ethical values to serve the society and nation.
- To promote innovative and original thinking in the minds of budding engineers to face the challenges of future.
- Innovators and integrators of ideas and technologies across the public, private and academic sectors
- To interact with industry and keep the department on the frontlines of technical advances and emphasize R&D.

## **MECHANICAL ENGINEERING**

### **VISION**

- To excel in Mechanical Engineering education, Research and Development through innovation and technology.

### **MISION**

- Provide quality education and skills to make the students globally sustainable Mechanical Engineers.
- Provide research oriented industry interaction to create and disseminate practical knowledge.
- Educate students about professional and ethical responsibilities for their career development and lifelong learning.

### **3. PROGRAM EDUCATIONAL OBJECTIVES, PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

#### **Program Educational Objectives (PEOs):**

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

#### **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 behaviors that students acquire as they progress through the program.

#### **Program Specific Outcomes (PSOs):**

Program Specific Outcomes are statements that describe what the graduates of a specific engineering program should be able to do.

**DEPARTMENTS PSO's****ELECTRONICS AND COMMUNICATION ENGINEERING****PSO 1**

Design, analyze and develop modules and systems for applications in advanced electronics and communication systems.

**PSO 2**

Utilize modern tools for modeling and computational techniques in IC fabrication and RF technologies.

**COMPUTER SCIENCE ENGINEERING****PSO 1**

Learn the fundamental concepts and methodology of computer system and apply them to various areas such as operating system, data structure, computer network, databases in the design and implementation of complex system.

**PSO 2**

The ability to employ modern computer programming languages, tools and platform to address technological challenges in multidisciplinary areas of engineering.

**CIVIL ENGINEERING****PSO 1**

The programme enables Sustainable solutions with Modern management and innovative Construction techniques.

**PSO 2**

The student has ability to apply Civil engineering principles for Quality construction projects with State of the art tools.

**MECHANICAL ENGINEERING****PSO 1**

Good skills on CNC, CAD & CAE for precision systems design and development.

**PSO 2**

Knowledge and skills of designing and manufacturing various mechanical systems.

## STATEMENTS OF PEOs, POs AND PSOs

### PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

#### **PEO1-CORE PROFICIENCY**

Graduates will be empowered with strong fundamental concepts, analytical capability, programming and problem-solving skills.

#### **PEO2- PROFESSIONALISM**

Graduates will be employed, may pursue higher education or undertake research.

#### **PEO3- LEARNING ENVIRONMENT**

Graduates will embrace Professional Career Growth with Values & Ethics and urge for lifelong learning.

### **The Process for Establishing the PEO's:**

The PEOs are established through the following process steps:

**STEP- 1:** Vision and Mission of the Institute & Department are taken into consideration to interact with various stake holders, and establish the PEO's.

**STEP- 2:** The Head of the Department, Department Academic Committee and other Senior Faculty prepares the draft version of PEOs and POs.

**STEP- 3:** The draft version is discussed with stakeholders and their views are collected by the Program co-coordinator.

**STEP- 4:** The Department Assessment Audit Committee reviews and analyzes the PEOs and Pos and submits its Recommendations to the Departmental advisory Board.

**STEP- 5:** The Departmental advisory Board deliberates on the recommendations and freezes the PEOs and POs and submits them to the BOG for final approval.

The Program curriculum is designed by incorporating inputs from members of Board of Studies and Academic council who are drawn from various academic institutions, R&D organizations and industry.

Inputs are also obtained from alumni and other stakeholders. Besides, a skill in demand analysis is carried out periodically to identify the core areas in the ECE domain that are consistent with industry needs. Thus, the PEOs are established, checked for consistency with the mission statement of the department.



The process steps followed for establishing the PEO's for B. Tech (ECE) program are illustrated in the flow chart Figure 4.1.

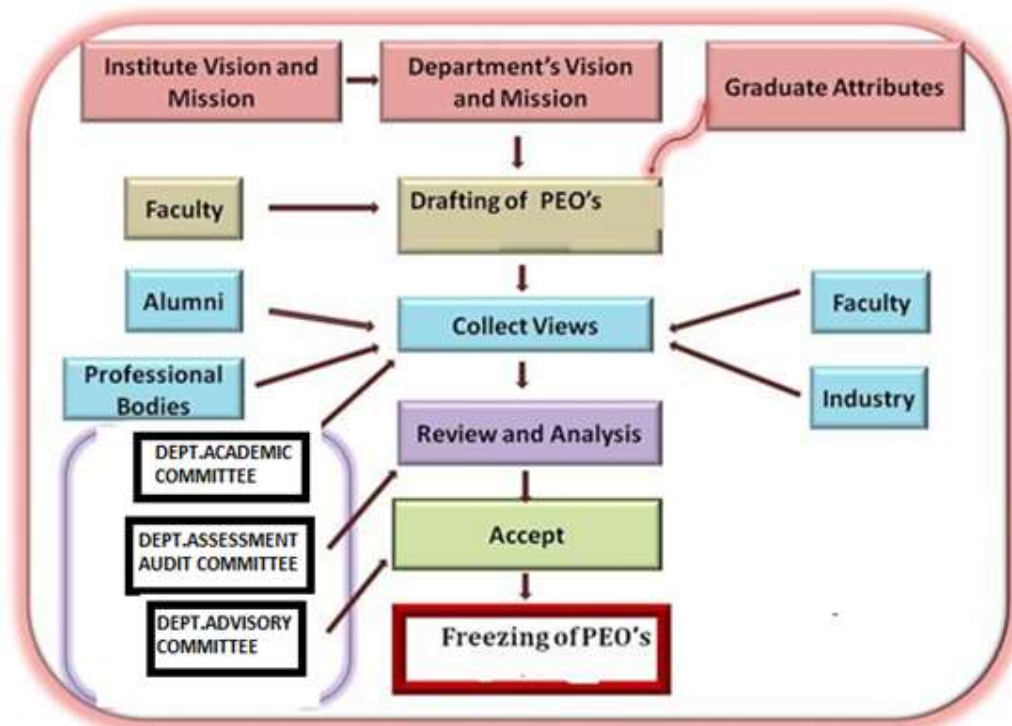


Figure 4.1: Process to Define PEO's of the Department

**PROGRAM OUTCOMES (POs):**

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

## The POs are published and disseminated

The Program Outcomes are published and disseminated as follows

How Published	Where Published	How Disseminated
<b>Incorporating in booklet given in orientation, syllabus book, course files and lab manuals</b>	<ul style="list-style-type: none"> <li>• Orientation booklet</li> <li>• Syllabus books</li> <li>• Course files and lab manuals</li> <li>• Laboratories in the departments</li> </ul>	<ul style="list-style-type: none"> <li>• Distribution and explanation to students on orientation day</li> <li>• Discussed during Orientation Day</li> <li>• Discussed during student Counseling</li> <li>• Distributed along with</li> <li>• Syllabus books, course files and lab manuals</li> </ul>
<b>Flexi/ Banner</b>	<ul style="list-style-type: none"> <li>• Classrooms/Laboratories</li> <li>• Office of the department</li> <li>• Department Notice boards</li> <li>• Staff Rooms</li> </ul>	<ul style="list-style-type: none"> <li>• Self-reading by students, parents and alumni</li> </ul>
<b>Digital Media</b>	<ul style="list-style-type: none"> <li>• Institute Website: <a href="http://www.sreyas.ac.in">www.sreyas.ac.in</a></li> </ul>	<ul style="list-style-type: none"> <li>• Available for Self-reading in public domain</li> </ul>

Table 3.1: PO publishing and dissemination

## The Process for Establishing the PSO's

The POs are established through the following process steps:

The Vision, Mission PEOs of the Department along with the 12 Graduate Attributes is used in defining the PSOs.

**Step 1:** Department Academic Committee consults the key constituents: faculty and collects their views and prepares the draft version of the PEOs and PSOs.

**Step 2:** The Department Academic Committee then gather views from the Alumni, Professional Body representatives, Industry representatives / Employer along with the faculty and revise the draft.

**Step 3:** The Department Assessment Audit Committee analyze and express its opinion on the revised PEOs and PSOs and forwards the same for final approval to Department Advisory Committee.

**Step 4:** Department Advisory Committee deliberate on the views expressed by the Department Assessment Audit Committee and formulate the accepted views based on which PSOs are to be established.



**PROGRAM SPECIFIC OUTCOMES (PSOs):**

**The graduates of the department will attain:**

**PSO1:** Design, analyze and develop modules and systems for applications in advanced electronics and communication systems.

**PSO2:** Utilize modern tools for modeling and computational techniques in IC fabrication and RF technologies.

**Program Educational Objective (PEO's):**

**The graduates of the department will attain:**

**PEO1:** Graduates will be empowered with strong fundamental concepts, analytical capability, programming and problem-solving skills.

**PEO2:** Graduates will be employed or may pursue higher education or undertake research.

**PEO3:** Graduates will lead in their profession with integrity and civic responsibility and a continuous learning attitude.

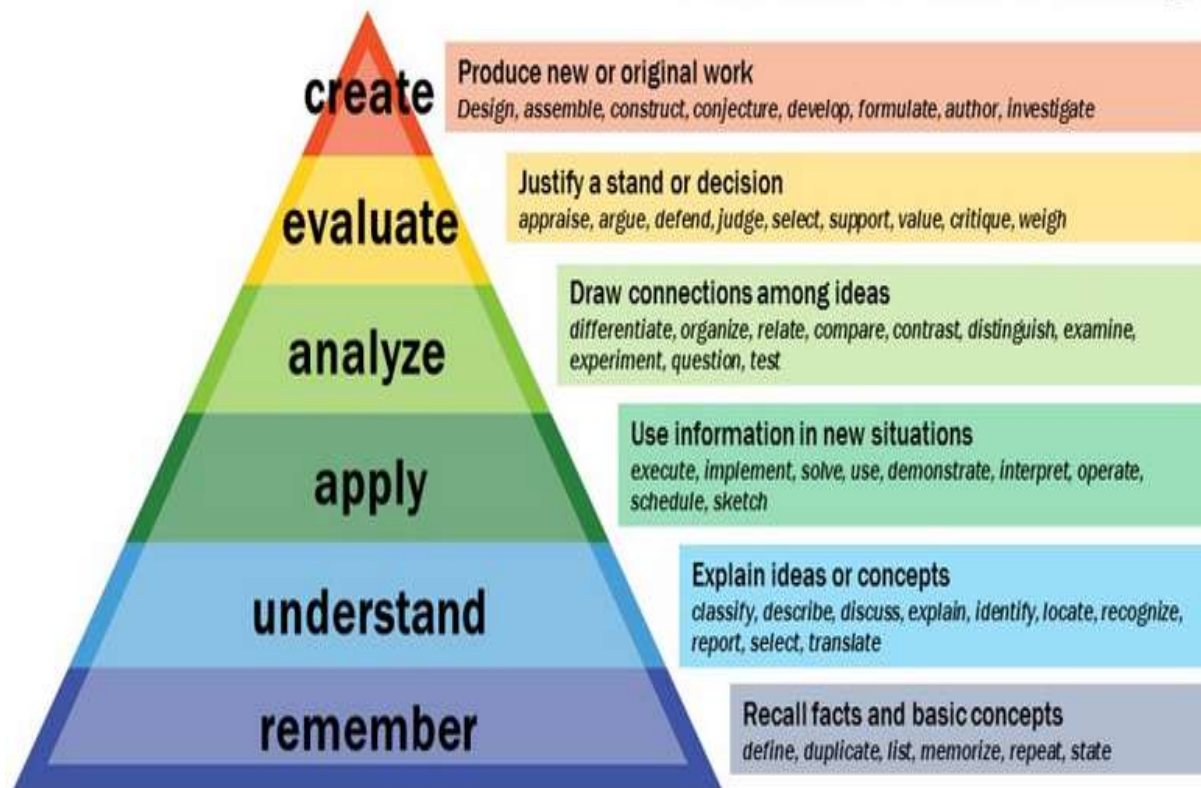
#### 4. BLOOM'S TAXONOMY

Bloom's Taxonomy was created in 1956 under the leadership of educational psychologist Dr Benjamin Bloom in order to promote higher forms of thinking in education, such as analyzing and evaluating concepts, processes, procedures, and principles, rather than just remembering facts. It is most often used when designing educational, training, and learning processes.

Domains	Keywords	Example
<b>Remembering:</b> Recall or retrieve previous learned information.	defines, describes, identifies, knows, labels, lists, matches, names, outlines, recalls, recognizes, reproduces, select, state.	Recite a policy. Quote Prices from memory to a customer. Recite the safety rules.
<b>Understanding:</b> Comprehending the meaning, translation, interpolation, and interpretation of instructions and problems. State a problem in one's own words.	comprehends, converts, defends, distinguishes, estimates, explains, extends, generalizes, gives an example, infers, interprets, paraphrases, predicts, rewrites, summarizes, translates	Rewrite the principles of test Writing. Explain in one's own words the steps for performing a complex task. Translate an equation into a Computer spreadsheet.
<b>Applying:</b> Use a concept in a new situation or unprompted use of an abstraction. Applies what was learned in the classroom into novel situations	applies, changes, computes, constructs, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses	Use a manual to calculate an employee's vacation time. Apply laws of statistics to Evaluate the reliability of a written test.

in the workplace.		
<p><b>Analyzing:</b> Separates material or concepts into component parts so that its organizational structure may be understood. Distinguishes between facts and inferences.</p>	<p>analyzes, breakdown, compares, contrasts, diagrams, deconstructs, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, relates, selects, separates</p>	<p>Troubleshoot a piece of equipment by using logical deduction. Recognize logical fallacies in reasoning. Gathers information from a department and selects the required tasks for training.</p>
<p><b>Evaluating:</b> Make judgments about the value of ideas or materials.</p>	<p>appraises, compares, concludes, contrasts, criticizes, critiques, defends, describes, discriminates, evaluates, explains, interprets, justifies, relates, summarizes, supports</p>	<p>Select the most effective solution. Hire the most qualified candidate. Explain and justify a new budget.</p>
<p><b>Creating:</b> Build a structure or pattern from diverse elements. Put parts together to form a whole, with emphasis on creating a new meaning or structure.</p>	<p>categorizes, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes</p>	<p>Writeacompanyoperationsorprocessmanual.Designamachinetoperformaspecifictask.Integratetrainingfromseveralsources to solve a problem. Revises and process to improve the outcome.</p>

# Bloom's Taxonomy





## 5. COURSE OUTCOME STATEMENT

### 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.

### SAMPLE CO STATEMENTS:

Course: **SIGNALS & STOCHASTIC PROCESS**

Course Code: **EC304ES**

**Table 6.1:** Sample CO statements

Upon successful completion of this course, students should be able to

COURSE OUTCOMES	
C204.1	Represent any arbitrary analog or digital time domain signal
C204.2	Analyze Fourier series and Fourier transform for standard signals, sampling of band limited signals.
C204.3	Apply the LT and ILT to find the ROC for different types of signals.
C204.4	Apply the ZT and IZT for discrete time signals and to find the ROC of ZT, of different types of signals
C204.5	Describe and interpret the basic concepts of Probability and Stochastic Process.
C204.6	Learn spectral characteristics of random process.

## 6. CO – PO AND CO – PSO MAPPING OF COURSES

All the courses together must cover all the POs (and PSOs). For a course we map the COs to POs through the CO-PO matrix and to 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.

### Levels of Outcomes

There are four levels of outcome such as Course Outcome (CO), Program Outcome (PO), Program Specific Outcome (PSO) and Program Educational Objective (PEO). Course Outcomes are the statements that declare what students should be able to do at the end of a course. POs are defined by Accreditation Agencies of the country (NBA in India), which are the statements about the knowledge, skills and attitudes, graduate attributes of a formal engineering program should have. Graduates Attributes (GAs) are the components indicative of the graduate’s potential to acquire competence to practice at the appropriate level. GAs form a set of individually assessable outcomes of the program. The NBA laid down the graduate attributes relating to program outcomes and is to be derived by program.

The Program outcomes reflect the ability of graduates to demonstrate knowledge in fundamentals of Basic Sciences, Humanities and Social Sciences, Engineering Sciences and apply these principles in understanding and practically apply the knowledge in professional core subjects, electives and projects which enables the graduates to be competent at the time of graduation. The graduates must adhere to professional and ethical responsibilities in the pursuit of their careers and also for the benefit of the society. These outcomes also enable the graduate to pursue higher studies and engage in R&D for a successful professional career.

The proper definition and the attainment of POs contribute to the attainment of Program Educational Objectives which will help the graduate to perform his/ her duties, professional responsibilities, design, development, production and testing of novel products, ability to deal with finances and project management during his/her early professional career of 3 to 4 years.

Program Specific Outcomes are the statements that assert what the graduates of a specific engineering program should do what they can able to do. Program Educational Objectives are the broad statements which describe in detail about the career and professional accomplishments after significant years of graduation that the program prepares the graduates to achieve.

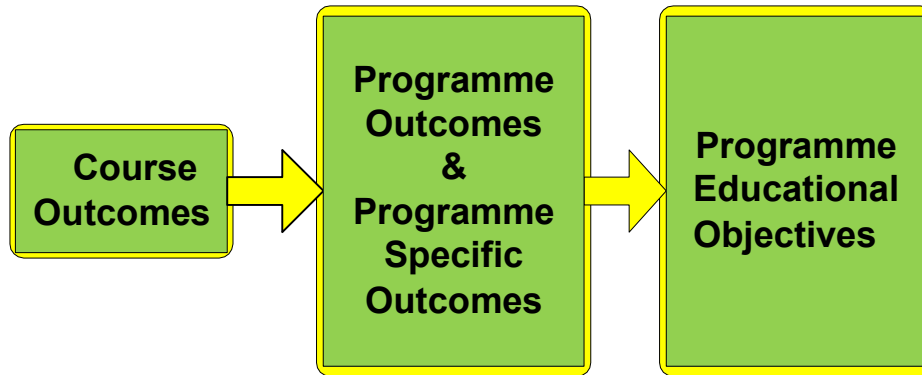


Figure 6.1: Relating the outcomes (CO-PO&PSO-PEO)

After CO statements are developed by the course in-charge, CO will map with any possible PO's based on the relationship exist between them. But the PO's are not necessarily mapped with any one CO and it may be left blank. Anyhow, it is mandatory that all POs should be mapped with any one of PSO and PEO which are specified in the program. This is shown in figure 7.2.

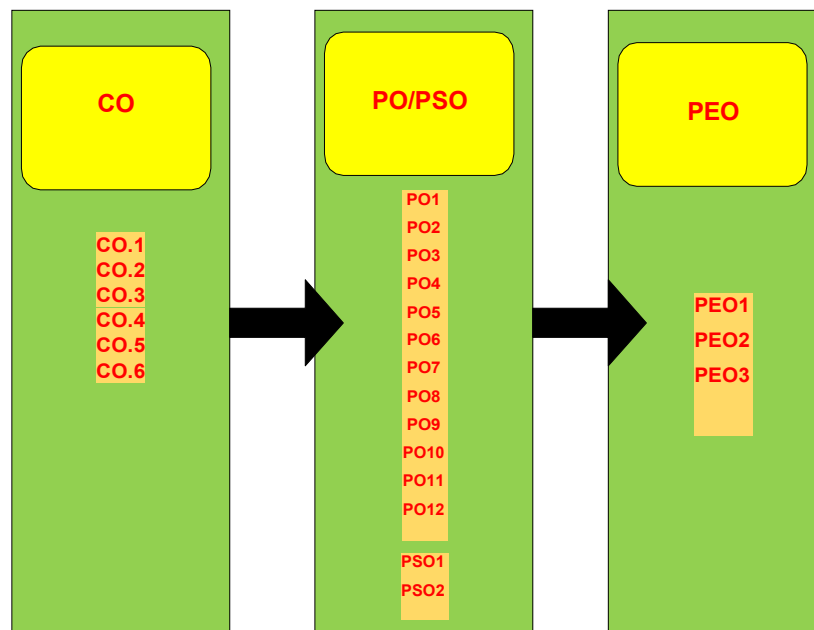


Figure 6.2 : Relationship between CO, PO & PSO and PEO

## Process involved in CO-PO Mapping

The role of CO-PO mapping will be assigned to the faculty as per hierarchy followed in figure 7.3. 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 behavior that students will acquire through the course.

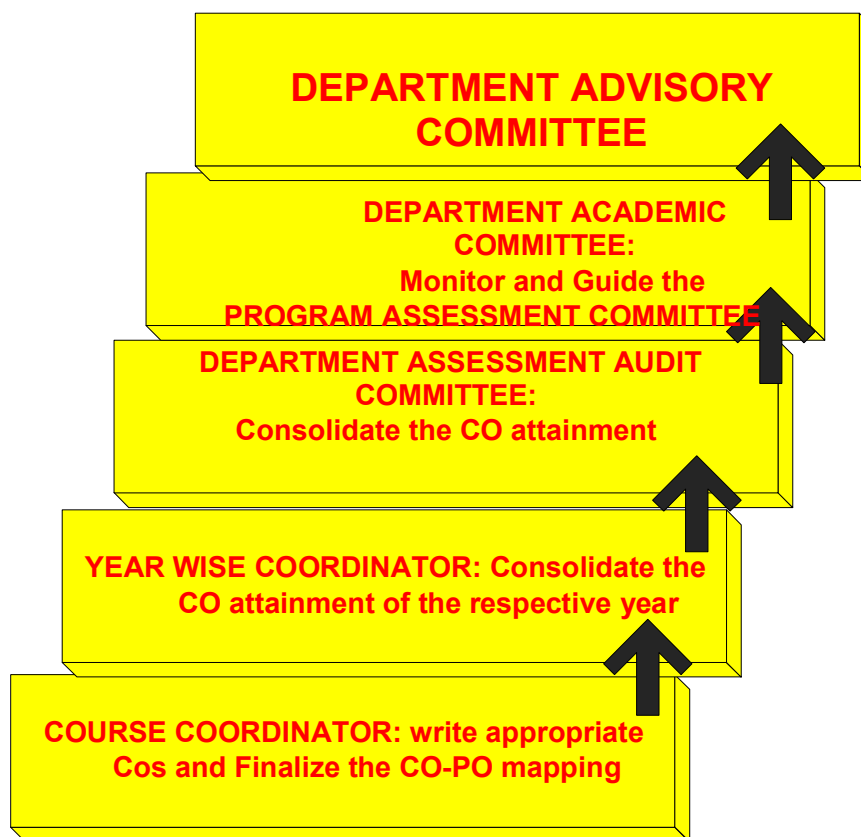


Figure 6.3: Hierarchy of faculty involvement

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 student's extra-curricular and co-curricular activities. These details will hand over to the Department Academic Committee in order to evaluate PO attainment of the individual student as well as individual course at the end of the eighth semester. The Department Academic Committee 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).

### **SAMPLE CO-PO AND CO-PSO MAPPING:**

Course: **SIGNALS & STOCHASTIC PROCESS**

Course Code: **EC304ES**

Mapping of CO with PO

First two numeric digits indicates year and semester of study, the third digit indicates serial number of course in the JNTUH prescribed syllabus copy. C204.1 is the fourth course in second year first semester. A sample course outcome statements and sample CO-PO matrix are given in Table 7.1 based on CO statements given in table 6.1.

The CO-PO mapping has been done with correlation levels of 3, 2, 1 and '-'. The notation of 3, 2 and 1 denotes substantially (high), moderately (medium) and slightly (low). The meaning of '-' is no correlation between CO and PO.

<b>Course Outcomes SSP(EC304ES)</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>C204.1</b>	3	3	1	1	-	-	-	-	-	-	-	-
<b>C204.2</b>	3	3	1	2	-	-	-	-	-	-	-	-
<b>C204.3</b>	3	2	1	1	-	-	-	-	-	-	-	-
<b>C204.4</b>	3	2	1	2	-	-	-	-	-	-	-	-
<b>C204.5</b>	3	3	1	2	-	-	-	-	-	-	-	-
<b>C204.6</b>	3	3	1	1	-	-	-	-	-	-	-	-
<b>Average CO(SSP)</b>	<b>3</b>	<b>2.67</b>	<b>1</b>	<b>1.5</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

Table 6.1: Sample CO-PO Matrix

Course Outcomes SSP(EC304ES)	PSO1	PSO2
C204.1	2	1
C204.2	2	1
C204.3	2	1
C204.4	2	1
C204.5	2	1
C204.6	2	1
<b>Average CO(SSP)</b>	<b>2</b>	<b>1</b>

### Process used to identify the curricular gaps to the attainment of COs/Pos

The process used to identify the curricular gaps to the attainment of COs/POs is given in figure 7.3 and is explained as below:

**Step-1:** The course handling faculty, after CO-PO mapping, would submit CO attainment to Course coordinator.

**Step-2:** The course coordinator would submit the CO-PO attainment along with curriculum gap identified in the course and recommendations to conduct co-curricular activities & identify content beyond the syllabus to Year wise coordinator.

**Step-3:** The year wise coordinators who are the members of the Department Assessment Audit Committee would consolidate the CO attainment of the respective year along with curricular gaps and recommendations to conduct co-curricular activities reported by course coordinators.

**Step-4:** The Department Assessment Audit Committee would consolidate the CO and PO attainment of the programme with all the identified gaps and submit report to DAC.

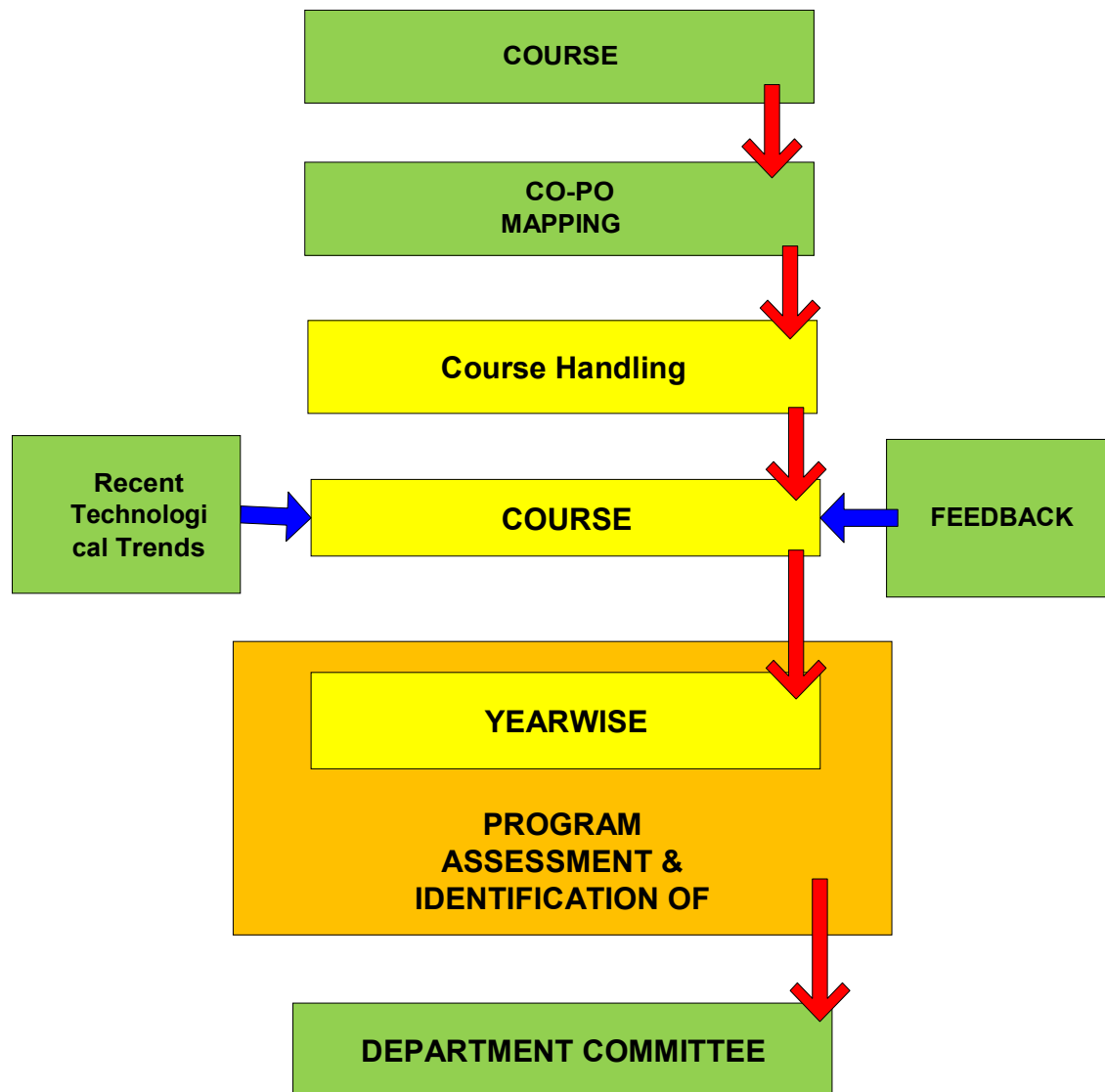


Figure 6.4: Identification of curricular gap

Department Assessment Audit Committee after getting prior approval from Department Academic Committee about the steps to be taken to bridge the curricular Gap and content beyond the syllabus may be delivered to the students through teaching, arranging guest lectures, industrial visit, in plant training, online quiz, etc.

## 7. COURSE OUTCOMES TO PO AND PSOMAPPING

Mapping strength of a course to PO/ PSO can be obtained by taking the average of the CO-PO/ PSO mapping matrices of that course.

SAMPLE COURSE-PO AND COURSE-PSO MAPPING

Course: SIGNALS & STOCHASTIC PROCESS

Course Code: EC304ES

Course Outcome SSP(EC304ES)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Average CO(EC304ES)	3	2.67	1	1.5	-	-	-	-	-	-	-	-

Course Outcome SSP(EC304ES)	PSO1	PSO2
Average CO(EC304ES)	2	1

Program level CO-PO matrix for all the courses including first year courses will be done by the Department Academic Committee and a sample is given in figure Table 8.1.

Program level CO-PO matrix

### MAPPING OF COURSE WITH PO's and PSO's FOR

BATCH: 2014-2018

YEAR /SEM	CourseCode	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
FIRST YEAR	A10001									1	2				
	A10002	3	1.8	1	1	1									
	A10003	1.6	1.4	1	1.5	1.2									
	A10004	2.8	1.6	1	1.2	2									
	A10005	1.33	1	1		1									
	A10501	1.8	2.2	1	1	1.25							1		
	A10301	2	1	1	1	1									
	A10581	2.8	2.6	1	1	1.25							1		
	A10081	2	2	1	2	3									



	A10083									1	2.2				
	A10082														
II YEAR I SEMESTER	A30007	2.2	3	3	2	2	-	-			-	-			
	A30405	3	3	2	2										
	A30407	2.4	2.4	2.6	2.6	-	-	-	-	-	-	-	1	2.2	2.2
	A30204	1.5	1.5	2	1								1	1	
	A30404	1.2	2	2.5	1.67									2	2.67
	A30406	2.6	3	2.4	2.2	1.6								1.4	1.4
	A70515	2.2	1.8											2	1.5
	A30481	3	3	2.2	2	2								1.4	1.4
	A40215	1.8	2.4	2.2	1.4	1.3	-	-	-	-	-	-		1.3	
	A40412	1.6	2.8	2.8	2.4	2.2	2	1	1	-	1	-	1.5	2.4	2.4
A40415	1	2.2	2.8	2.5	-	-	-	-	-	-	-		2.2	2.4	
A40009					1	1.5	1.66	1	-	-	1	1			
A40411	3	3	3	2.6	3								1.2	1.2	
A40410	1.6	2	2	1	1.2									1	
A40288	1.2	2.6	2.4	3	3								2.8		
A40484	1.8	2	2	1.4	1	-	-	-	-	-			1		
III YEAR I SEMESTER	A50217	3	2.6	1.6	3	1.4	1.4							1.4	
	A50516	1.2	1.4		2									1	1.2
	A50418	2.2	1.8	2.2	1									1.8	1
	A50422	1	1.2	1.5	2								1	2.5	
	A50408	2.6	2	2		1								1	1
	A50425	1	2.4	2.6	2									1.8	1.8
	A50482	2	1			3								2	1
	A50488	2	2	1			3							1	1.4
III YEAR II SEMESTER	A60010		1.8	1.5		1.6							2.8		
	A60110	1		2		1	1.5		2	1			2		
	A60420	2	1.5	2.2	2.5									2	3
	A60432	1.75	2	2.2	2.6	3								2.5	2.75
	A60430	2.4	2	1	3	2	2						2.25	2.5	2
	A60421	3	1.8	1.6	1.25									2	
	A60494	1.6	1	1		1		1		1		1	1	1	1.2
	A60493	3	1.67	1		1.67				1			1		2

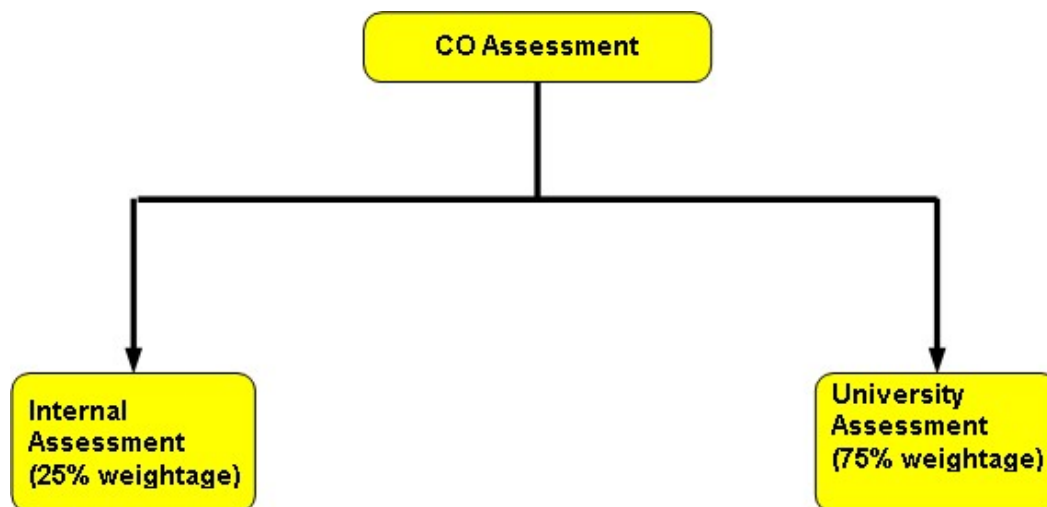
<b>IV YEAR I SEMESTER</b>	A70014	2	2	3	2	3	3	-	3	3	3	3	3		
	A70422	3	3	1	-	1	-	-	-	-	-	-	2	2	2
	A70515	3	3	3	2	1	1	1	-	-	-	-	1	3	3
	A70434	2	2	2	2									2	2
	A70436	3	3	2	1								2	2	
	A70440	2	2	3	2	1			1			1	1	2	
	A70086	1	2		2		1			1	3	1	2		
	A70499	3	2	2	1		1	1				1		1	2
<b>IV YEAR II SEMESTER</b>	A80452	3	3	1	1		2	2				1		3	1
	A80450	3	2		1									2	
	A80437	3	3	2	1	1		1						3	2
	A80087	1.54	1.49	2.64	3	3	1	1	1	3	3	2	1	3	3
	A80089	3	3	3	3	3	3	1		1	3	3	3	3	3
	A80088	1.54	1.49	2.64	3	3	1	1	1	3	3	2	1	3	2.33
	A80090	3	2	1	2	3	1				3	2	3	3	3
<b>AVERAGE</b>	<b>2.16</b>	<b>2.1</b>	<b>1.91</b>	<b>1.86</b>	<b>1.8</b>	<b>1.69</b>	<b>1.17</b>	<b>1.43</b>	<b>1.6</b>	<b>2.58</b>	<b>1.64</b>	<b>1.62</b>	<b>1.99</b>	<b>1.95</b>	

## 8. ASSESSMENTPROCESS

Assessment Process for CO Attainment:

For the evaluation and assessment of CO's and PO's, rubrics are used. The rubrics considered here are given below:

### 1. CO Assessment Rubrics:



Course Outcome is evaluated based on the performance of students in internal assessments and in university examination of a course. Internal assessment contributes 25% and university assessment contributes 75% to the total attainment of a CO.

#### (ii) CO-Assessment Process:

- **Assessment Parameters:** The performance of a student in each semester shall be evaluated course - wise with a maximum of 100 marks for theory course and 100 marks for laboratory.

#### 1. Theory course:

(i) **Pattern for Internal Midterm Examinations:** For theory courses of each semester there shall be two midterm descriptive & objective exams. Each descriptive & objective exam consists of 80 minutes. The mid exams will be taken for the assessment of internal marks. The first Midterm examination will be conducted usually after 7 weeks of instruction; the second Midterm examination will be conducted at the end of the semester.

(ii) **CO-wise assessment Rubrics:** Every mid-exam question and every assignment is mapped to a specific CO. Thereafter, a CO -wise cut-off value is taken based on the highest

mark secured for that CO and the number of students with their internal mark above the cut-off value is considered for rating the CO attainment.

No. of students having marks > cut-off	Rating in 3 scale ( I )
$\geq 60\%$	3
50% to 59%	2
40% to 49%	1

(iii) Pattern for External End Examinations: There shall be an external examination for every theory course and consists of two parts (part- A and part-B). The duration of the time for this end examination is 3 hours.

Assessment Rubrics: An overall cut-off value is taken for all CO's commonly based on the highest mark secured and the number of students with their external mark above the cut-off value is considered for rating all CO attainments.

No. of students having marks > cut-off	Rating in 3 scale ( E )
$\geq 60\%$	3
50% to 59%	2
40% to 49%	1

(iv) Overall Attainment: The Final CO attainment is calculated by combining the internal attainment and External attainment in a ratio of 25: 75.

$$\text{Final Value (V)} = 25\% \text{ of Internal Level (I)} + 75\% \text{ of External Level (E)}$$

## 2. Laboratory Course:

Pattern for Lab Examinations: For practical subjects, there shall be continuous internal evaluation during the semester for 75 marks. 15 marks for day to day work, 5 for record and 50 marks to be awarded by conducting laboratory test and for 5 marks for Viva-voce.

CO-wise assessment Rubrics:

No. of students having marks > cut-off	Rating in 3 scale ( E )
$\geq 60\%$	3
50% to 59%	2
40% to 49%	1

### 3. Seminar Work Evaluation:

The Department selects a senior faculty member as a Seminar coordinator who along with other faculty would assess the Technical seminar presentations by students. He/She would ensure that the students choose advanced concepts in Electronics and allied research areas with a lot of relevance and applicability. One seminar per student in the VIII semester would be conducted as per the schedule mentioned prior in Time Table and Department Calendar of events. Seminar coordinators follow rubrics, which is set by the department for evaluation of seminar. Seminar coordinators will conduct one seminar per student. It will be evaluated by the seminar coordinator and marks will be submitted to the Department.

Rubrics	Max. Marks
Topic and Background Survey	20 % of Max. Marks
Slides and Report	20 % of Max. Marks
Presentation Skills	20 % of Max. Marks
Content and Explanation	30 % of Max. Marks
Q&A	10 % of Max. Marks

### 4. Project Work Evaluation:

#### Mini-Project:

There shall be an industry-oriented Mini-Project, in collaboration with an industry of their specialization, to be taken up during the vacation after III-year II Semester examination. However, the mini-project and its report shall be evaluated along with the project work in IV-year II Semester. The industry oriented mini-project shall be submitted in a report form and presented before the committee. It shall be evaluated for 50 marks. The committee consists of an external examiner, head of the department, the supervisor of the mini-project and a senior faculty member of the department. There shall be no internal marks for industry-oriented mini-project.

#### Major project:

- Project batches are formed as per the instruction given by project coordinators.
- Synopsis will be submitted to the project coordinators for scrutinizing. Project Batches are allotted to the internal guides based on the specialization and competency skills of the faculties.
- Each internal guide will continuously monitor their students on a weekly basis to observe the progress of the work.

- The project guide along with project coordinator conduct 3 project reviews as per the rubrics, which is set by the Department and the submit the Internal Assessment marks to the Head of Department.
- External Project Viva voce is conducted by the panel of examiners deputed by the University.
- Based on the viva voce the marks are awarded to the students and submitted to university.
- The department will encourage students to participate in technical Expo and the project guides motivate and guide the students to publish in standard conference/journal forums.

#### Attainment of Program Outcomes and Program Specific Outcomes

The following are the Assessment Tools:

Several tools are described for assessing course outcomes. The program outcomes are based on the course outcomes. Thus, the tools remain the same for assessing the program outcomes. In addition, the tools of survey based on the alumni and exit surveys are considered.

1. The tools broadly are
2. End of course surveys (half yearly)
3. Student exit surveys
4. Alumni surveys yearly
5. Staff surveys – yearly
6. Higher education and placement – student publications

## Internal Assessment Tools

Component	Components of Evaluation	Nature of Exam
Theory	MCQ's	Multiple choice questions
	First Mid Exam	Short essay and long essay questions
	End Mid exam	Multiple choice questions
	MCQ's	Short essay and long essay questions
Practical	Daily evaluation	Planning, analysis of lab skills, finishing The experiment
	Practical examination	Synopsis, spotting and viva-voce, major experiment and minor experiment
	Laboratory manual	Communication, data interpretation
Beyond syllabus	Conducting 02experiments	
Overall Evaluation	External exam –semester wise	

University examinations:

Component	Components of Evaluation	Nature of exam
Theory	University end exams	Short essays, long essays, numerical Problems
Practical	University end exams	Synopsis, spotting, major experiment, minor experiment, interpretation, data analysis, viva voce, communication

**Assessment process:**

The assessment tools are direct and indirect methods for evaluating the attainment of POs.

Direct methods:

Through the internal and external assessment, the teacher can focus on the PO's. The question papers include, short answers, short essay and long essay type. In addition, MCQs examinations are conducted on each unit test. Assignments are given for some extension of syllabus. In case of laboratory examination, synopsis, major experiment, minor experiment, viva voce, reports, etc., are the components. While setting a question paper, each question is framed based on the POs in order to attain them to a large extent. A few POs of minor

importance may not be accommodated. It is necessary that a question has to cover 60% of ‘essentials to know’, 30% ‘better to know’ and 10% are ‘nice to know’. Therefore, special attempts are made to attain these objectives.

The subjects are also categorized as professional core subjects, basic science subjects (mathematics, science, computing, and humanities) and Engineering Sciences. Accordingly, the POs have assumed adequate importance. Having set the question papers, the answer papers are being evaluated from the same perspectives. The students are given feedback and POs are highlighted. Data are gathered after scrutinizing the answer for course outcomes. The course outcomes are translated to POs. Attainment of POs is considered from the data of all students.

Indirect methods: Survey is conducted from two levels: alumni and exit survey.

S.NO.	Direct Assessment	Method Description
1.	Internal Assessment Test	The Internal Assessment marks in a theory paper shall be based on two tests generally conducted at the end of 8 and 16 weeks of each semester (20) and assignment (5). An improvement test may be conducted for the desirous students before the end of the semester to give an opportunity to such students to improve their Internal Assessment Marks. It is a metric to continuously assess the attainment of course outcomes w.r.t course objectives. Average of the two tests marks obtained shall be the Internal Assessment Marks for the relevant subject.
2	Assignment	Assignment is a metric to mainly assess student’s knowledge/skills/attitude with their designing capabilities.
3	Lab Assignments	Lab Assignment can be one of the measuring criteria to mainly assess student’s practical knowledge with their designing capabilities. In case of Practical, the IA marks shall be based on day to work in the lab (15) and one practical exam (10).
4	Theory Semester Examination	Semester examination (theory or practical) are the metric to assess whether all the course outcomes are attained or not framed by the course owner. Semester Examination is more focused on attainment of course outcomes and uses a descriptive exam.
5	Practical Semester Examination	Practical semester examination focuses on conduction of experiments and viva-voce.
6	Seminar	The IA marks in the case of mini projects, projects and seminars in the final year shall be based on the evaluation at the end of 8th semester by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the project / seminar guide.
7	Mini project	
8	Major Project	



9	Comprehensive viva	Viva-voce examination in project work shall be conducted batch wise.
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### Indirect assessment tools

S. No.	Indirect Assessment	Method Description
1.	Alumni: Survey Questionnaire	Collect variety of information about program Satisfaction and college from the Alumni students.
2.	Exit Feedback: Survey Questionnaire	Collect variety of information about program Satisfaction and college from the final year students.
3.	Parent: Survey Questionnaire	Collect variety of information about program satisfaction and college from parents.
4.	Employer's Feedback Form	Collect variety of information about the graduates' skills, capabilities and opportunities.
5.	Student Feedback (About OBE)	Collect variety of information about outcome-based education in teaching and learning process.
6.	Feedback Form On Facilities	Collect variety of information about facilities from the students

### Assessment Methodology, tools and frequency of use for direct method

S. No	Assessment Method	Assessment frequency	Assessment Tool
1	Internal Assessment Test	At the end of 8 <sup>th</sup> and 116 <sup>th</sup> weeks of each semester.	Student's performance in internal Assessment booklets.
2	Lab Assessment Test	At the end of the semester	Student's performance in conducting experiments and journal writing.
3	Theory Semester Examination	At the end of the semester	Student's performance in university exams.
4	Practical Semester Examination	At the end of the semester	Student's performance In conducting experiments during University exams.
5	Seminar	During the 8 <sup>th</sup> semester	Rubrics
6	Mini project	At the end of the 6 <sup>th</sup> semester	Student's performance in university exams
7	Project	During the 8 <sup>th</sup> semester	Rubrics
8	Project Work Viva voce	At the end of the 8 <sup>th</sup> semester	Student's performance in university exams
9	Course Exit Survey	Semester end	Students survey

**PO Assessment Methodology, tools and frequency of use for indirect method**

S.No	Assessment Method	Assessment frequency	Assessment Tool
1	Program Exit Survey	Annually	Exit report from graduates
2	Alumni: PEO Survey Questionnaire	Annually	Exit report after 2 years of graduation
3	Parent: Survey Questionnaire	Twice in a year	Parents survey and focus discussions
4	Employer's Feedback	Annually	Performance report on employees
5	Student Feedback (About OBE)	Twice in a year	Students survey
6	Feedback on facilities	Twice in a year	Students survey

**Attainment Levels:**

Course outcomes of all courses are assessed with the help of above mentioned assessment tools and attainment level is evaluated based on set attainment rubrics as per table 9.2. If the average attainment of a particular course for two consecutive years is greater than 80% of the maximum attainment value (i.e. 80% of 3 = 2.4), then for that particular course the current rubrics for attainment must be changed to analyze continuous improvement.

Assessment Methods	Attainment Levels	
Internal Assessment	Level 1	40-50% of students scoring more than 60% marks in internal assessment tools
	Level 2	50-60% of students scoring more than 60% marks in internal assessment tools
	Level 3	60% of students scoring more than 60% marks in internal assessment tools
	Level 1	40-50% of students scoring more than 40%

University Assessment		marks in university examination.
	Level 2	50-60% of students scoring more than 40% marks in university examination.
	Level 3	60% of students scoring more than 40% marks in university examination.

**Validation of CO-PO mapping:**

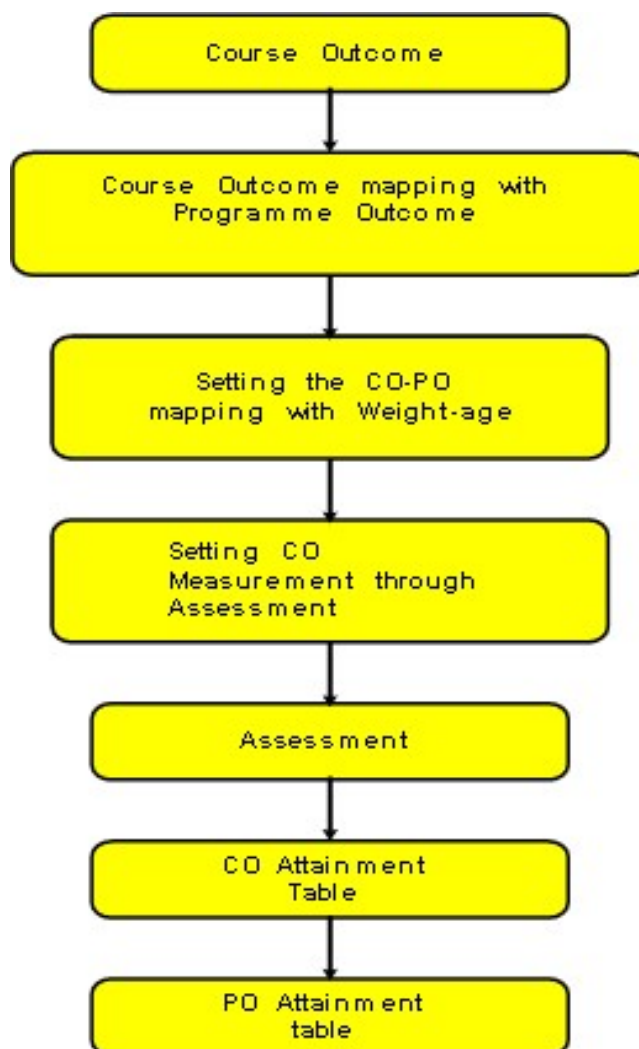


Figure 8.1: The process of CO-PO mapping validation

The process of CO-PO mapping validation is given in figure 9.1 and is explained as below:

Step 1: Obtain course outcome.

Step 2: Mapping of course outcome with program outcome.

Step 3: Setting weightage for CO assessment.

Step 4: CO measurement through assessment.

Step 5: Obtain CO attainment table through direct and indirect assessment methods.

Step 6: Obtain PO attainment table through direct and indirect assessment methods.

### **Assessment and Attainment methods:**

Assessment is one or more processes which is carried out by the institution, that identify, collect and prepare data to evaluate the achievement of course outcomes and program outcomes. 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 test and/or examination result. Assessment methods are categorized into two as direct method and indirect method to assess CO's and PO's. The direct methods display the student's knowledge and skills from their performance in the continuous internal assessment tests, semester examinations and supporting activities such as seminars, assignments, case study, group discussion, online quiz, mini project etc., These methods provide a sampling of what students know and/or can do and provide strong evidence of student learning. The indirect method done through surveys and interviews; it asks the stakeholders to reflect their views on student's learning. The institute assesses opinions or thoughts about graduate's knowledge or skills by different stakeholders.

### **CO assessment methods are employed**

Direct assessment method and indirect assessment method are considered for 80% and 20% weightages respectively.

Internal test assessment and end semester examination assessment are considered with the weightage of 25% and 75% respectively for the direct assessment of CO.

### **Procedure for Attainment of Program Outcomes**

At the end of the each programme, the PO/PSO assessment is done from the CO attainment of all curriculum components. As per NBA guidelines, program can appropriately define the attainment level. The attainment level may be set by the particular program or commonly by the institution. The attainment can be made as best the choice by the institution or the program by analyzing the students' knowledge. This can be achieved by using different supporting activities. This attainment is mainly for the purpose of making an esteemed

engineer with good analytical, practical and theoretical knowledge about the program by attaining the PEO's and PSO's of the program and the institution. For the evaluation and assessment of CO's and PO's, rubrics are used. The rubrics considered here are given below:

**Attainment Level 1:** 40-50% of students score more than 40% marks out of the maximum relevant marks.

**Attainment Level 2:** 50-60% of students score more than 40% marks out of the maximum relevant marks.

**Attainment Level 3:** 60% of students score more than 40% marks out of the maximum relevant marks.

### CO Attainment Calculation of a Course:

Sample calculation of theory course

MID 1							
S.No.	Roll No.	Descriptive				Objective	Assignment
		1 (5M)	2 (5M)	3 (5M)	4 (5M)	(10M)	(5M)
1	XXA1		2		3	8	5
2	XXA2	3		2		7	5
3	XXA3		1		4	5	5
4	XXA4		4	4		6	5
5	XXA5	2			5	7	5
6	XXA6			3		4	5
7	XXA7		5		2	7	5
8	XXA8	4			4	9	5
9	XXA9			3	1	3	5
10	XA10	1	3			4	5
11	XA11	5			2	6	5
12	XA12		2	5		5	5
13	XA13			2	5	6	5
No. of students attempted		5	6	6	8	13	13
No. of students scoring $\geq$ internal threshold		3	3	4	5	8	13
% of students scoring $\geq$ internal threshold		60	50	66.67	62.5	61.5	100
Mapping of question to CO		CO1	CO1	CO2	CO3	CO1, CO2, CO3	CO1, CO2, CO3

Example, for 1st question in descriptive, 5 students attempted and out of which 3 students scored more than equal to threshold (i.e. 60% of 5 marks = 3 marks).

$$\% \text{ of students scoring } \geq \text{ internal threshold} = \frac{\text{No. of students scoring } \geq \text{ internal threshold}}{\text{No. of students attempted}} * 100$$

$$= (3/5) * 100 = 60\%.$$

MID 2								
S.No.	Roll No.	Descriptive				Objective	Assignment	External
		1 (5M)	2 (5M)	3 (5M)	4 (5M)	(10M)	(5M)	(75M)
1	XXA1	3		5		7	5	-1
2	XXA2		1		4	5	5	29
3	XXA3	1	4		3	6	4	28
4	XXA4	2			3	4	5	40
5	XXA5		5	5	4	8	5	56
6	XXA6			3		5	4	27
7	XXA7	4			2	4	5	36
8	XXA8		4	1	5	7	5	40
9	XXA9	5		2	1	6	5	42
10	XA10		3			4	5	22
11	XA11	5		2		6	5	30
12	XA12		2	2		4	4	29
13	XA13	2			4	5	5	-1
No. of students attempted		7	6	7	8	13	13	11
No. of students scoring $\geq$ threshold		3	4	2	6	7	13	6
% of students scoring $\geq$ threshold		42.85	66.67	28.57	75	53.84	100	54.54
Mapping of question to CO		CO4	CO5	CO6	CO6	CO4, CO5, CO6	CO4, CO5, CO6	All COs

Sample Calculation for CO1,

- For Descriptive part, CO1 is tested in two descriptive questions in internal-1. In question 1, % of students scoring  $\geq$  threshold is 60% and in question 2, % of students scoring  $\geq$  threshold is 50%. Therefore, CO1 % of students scoring  $\geq$  threshold is the average of the above i.e. 55%.
- For Objective and assignment part, % of students scoring  $\geq$  threshold in the above parts will be considered in same manner for all the COs tested in that internal. i.e. 61.5% for objective and 100% for assignment, will be same for CO1, CO2 and CO3.

Based on the set attainment level, % of CO1 in all three parts is converted to attainments. All the three parts attainments are combined as below for internal attainment.

$$\text{Internal attainment} = (2*0.4) + (3*0.4) + (3*0.2) = 2.6.$$

(Descriptive & objective part are 40% of internal max marks each and assignment is 20%, hence Descriptive & objective part attainments are multiplied by 0.4 and assignment is 0.2)

- For external, as we are unaware of how many marks are secured by students on each question basis, we consider % of students scoring  $\geq$  threshold for external as same for all COs.

25% of Internal and 75% of external attainments are considered for direct attainments

$$\text{Direct attainment} = (2.6*0.25) + (2*0.75) = 2.15$$

- For indirect, course exit survey is taken from all students on each CO on a scale of 0 to 3.

Score given by each student are taken average for each CO.

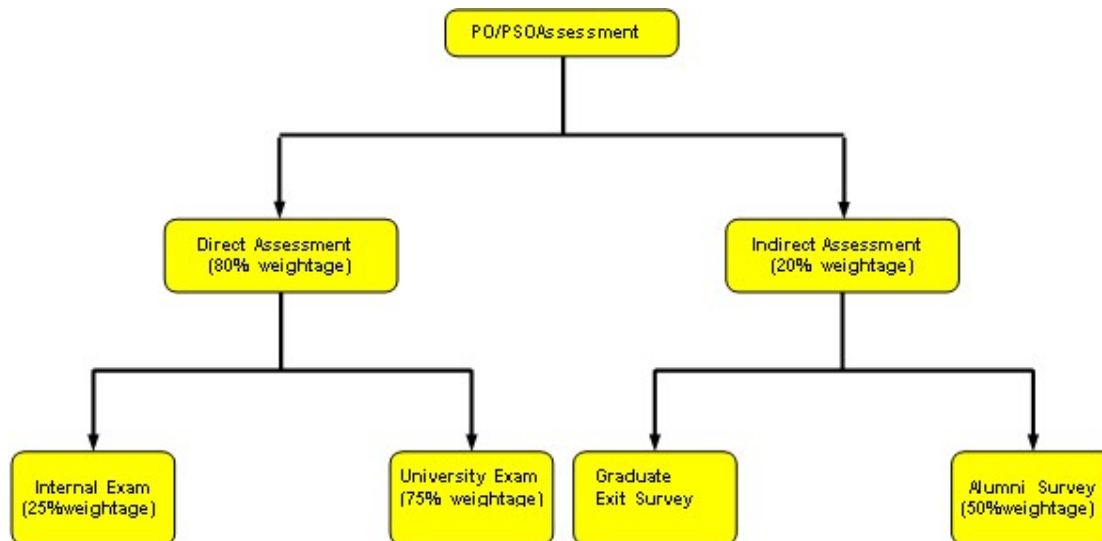
- 80% and 20% are considered for direct and indirect for CO attainment.

$$\text{CO1 Attainment} = (2.15*0.8) + (2.36*0.2) = 2.19$$

COs	DES	OBJ	ASN	DES	OBJ	ASN	INT	EXT	DIRECT	INDIRECT	CO_Atn
CO1	55	61.5	100	2	3	3	2.6	2	2.15	2.36	2.19
CO2	66.6	61.5	100	3	3	3	3	2	2.25	2.47	2.29
CO3	62.5	61.5	100	3	3	3	3	2	2.25	2.41	2.28
CO4	42.8	53.8	100	1	2	3	1.8	2	1.95	2.45	2.05
CO5	66.6	53.8	100	3	2	3	2.6	2	2.15	2.45	2.21
CO6	51.7	53.8	100	2	2	3	2.2	2	2.05	2.47	2.13

## 9. ASSESSMENT PROCESS FOR OVERALL PO AND PO ATTAINMENT

### PO and PSO Assessment Process



PO/PSO assessment is done by giving 80% weightage to direct assessment and 20% weightage to indirect assessment. Direct assessment is based on CO attainment, where 75% weightage is given to attainment through university exam and 25% weightage is given to attainment through internal assessments. Indirect assessment is done through Graduate exit survey and alumni survey where Graduate exit survey and alumni survey is given a weightage of 50% each.

### PO and PSO Assessment Tools

The various direct and indirect assessment tools used to evaluate POs & PSOs and the frequency with which the assessment processes are carried out are listed in table 10.1.

Table 10.1 Assessment tools used for evaluation of PO and PSO attainment



PO, PSO ASSESSMENT TOOLS					
Direct (80% weightage)	CO Assessment	Course Type	Assessment Tools		Minimum Frequency
		Theory	Internal Evaluation	Internal mid Tests	Twice per course
				Assignments	Twice per course
			University Exam		Once per course
		Practical	Internal Evaluation	Daily	Every lab
				Internal Lab exam	Once per course
			University Exam		Once per
		Mini project	Internal Evaluation - Reviews		One per course
			University Viva voce		Once per course
		Comprehensive Viva	Internal Evaluation		Once per course
Seminar	Presentation		Once per course		

		Major Project	seminars	Twice per course
			External Viva voce	Once per
			Report	Once per
Indirect 20% Weightage	Surveys	Graduate Exit Survey		At the end of the Program
		Alumni Survey		Once per year

**Quality / relevance of assessment tools and processes:**

## (i) Direct Assessment Tools and Process:

Direct assessment tools are used for the direct assessment of POs and PSOs. Initially, the attainment of each course outcome is determined using internal as well as external (university exam) assessment. The each PO attainment of corresponding to a particular course is determined from the attainment values obtained for each course outcome related to that PO and the CO-PO mapping values. Similarly, the values of PSO attainment are also determined.

## (ii) Indirect Assessment Tools and Process:

Indirect assessment is done through program exit survey, alumni survey and employer survey where program exit survey and employer survey are given a weightage of 25% each and alumni survey is given a weightage of 50%.

## 1. Graduate Exit Survey:

Identify the degree to which the facilities at SREYAS helped your ward to develop the skills and abilities to be successful in his professional life with (a) High-3 (b) Moderate -2

(c) Low-1

S. No	Information	Grade
PO 1	Application of Engineering fundamentals	
PO 2	Problem solving capability	
PO 3	Designing capability for specific Engineering needs	
PO 4	Capability to conduct investigations of complex problems	
PO 5	Usage of modern tools in engineering	
PO 6	Engineering practice with social responsibility	
PO 7	Understanding of development with sensitivity to environment	
PO 8	Professional ethics in engineering practice	
PO 9	Team work & leadership skills	
PO 10	Effective communication skills	
PO 11	Managerial skills and finance handling capability	
PO 12	Ability to engage in independent and Lifelong learning	

S. No	Information	Grade
PSO 1	Design, Analyze and develop modules and systems for applications in advanced electronics and communication systems.	
PSO 2	Utilize modern tools for modeling and computational techniques in IC fabrication and RF technologies	

S. No	Information	Grade
PEO 1	Graduates will be empowered with strong fundamental concepts, analytical capability, programming and problem-solving skills.	
PEO 2	Graduates will be employed, may pursue higher education or undertake research	
PEO 3	Graduates will embrace Professional Career Growth with Values & Ethics and urge for lifelong learning.	

S.No	Facility	Grade	S.No	Facility	Grade
1	Class rooms		6	Medical	
2	Laboratory infrastructure		7	Transport	
3	Sports and cultural facilities		8	Mentoring	
4	Research		9	Grievances handled	
5	Library		10	Placement opportunities	

#### Relation of POs and PSOs with questionnaire:

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Questions	Q3	Q3	Q3,Q4	Q4,Q5	Q5	Q6,Q9	Q6	Q6	Q7	Q7	Q5,Q7	Q6,Q8

PSOs	PSO1	PSO2	
Questions	Q3	Q5,Q6,Q8	

#### (iii) Evaluation Process

The questionnaire consists of 10 questions which is 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 3,2,1 respectively. These survey results are tabulated and the average values corresponding to each PO and PSO are determined.

## 2. Alumni Survey:

Evaluation of Programme Effectiveness: *identify the degree to which your program helped you to develop the skills and abilities to be successful in your professional life with* (a). High-3 (b) Moderate -2 (c) Low-1 (d) Poor-0

S.No	Programme Specification	Grade
1	Application of Engineering fundamentals	
2	Problem solving capability	
3	Designing capability for specific Engineering needs	
4	Capability to conduct investigations of complex problems	
5	Usage of modern tools in engineering	
6	Engineering practice with social responsibility	
7	Understanding of development with sensitivity to environment	
8	Professional ethics in engineering practice	
9	Team work & leadership skills	
10	Effective communication	
11	Managerial skills and finance handling capability	
12	Ability to engage in independent and Lifelong learning	

S.No	Suggestions	Yes/No
1	Can you suggest any technical content that would augment existing curriculum?	
2	Suggest how SREYAS can help, improve the placement opportunities for its students.	
3	Specify tools / Novel Technologies needed to meet the current Job requirements.	
4	Have you received any award / recognition in your professional career?	
5	Have you published any research / technical paper in your profession?	
6	Will you recommend your relative/friends to enroll in SREYAS?	
7	Would you like to associate with the Institute / Department in any of the following; (a) Project (UG/PG) (b) Training Students (c) Expert Lectures / Workshops (d) Consultancy (e) Industrial Visits (f) Placement (g) Industrial Linkages (h) R & D	

**Career Information**

Placement:

Company	
Designation	
Package	

## Higher Education

University	
Degree	
Admission No	

## Entrepreneur

Industry (Small/Large Scale)	
No of Employees	
Product	
Investment/Budget/Capital	

Relation of POs and PSOs with questionnaire:

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Questions	Q3	Q3,Q5	Q3	Q5	Q5	Q5,Q10	Q8,Q10	Q10	Q8	Q6	Q5,Q6,Q8	Q7

PSOs	PSO1	PSO2	PSO3
Questions	Q3,Q4,Q5	Q5,Q7,Q10	Q6,Q8,Q9,Q10

**(i) Evaluation Process**

The questionnaire consists of 9 questions which is 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 tabulated and the average values corresponding to each PO and PSO are determined.

**Indirect Attainment:**

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Graduate Exit Survey	Attainment values of Graduate Exit Survey											
Alumni Survey	Attainment values of Alumni Survey											
Overall Attainment	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	I <sub>4</sub>	I <sub>5</sub>	I <sub>6</sub>	I <sub>7</sub>	I <sub>8</sub>	I <sub>9</sub>	I <sub>10</sub>	I <sub>11</sub>	I <sub>12</sub>

Indirect Attainment  $I_i = 50\%$  attainment of Graduate Exit survey  $+50\%$  attainment of Alumni survey.

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Direct Attainment	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	D <sub>5</sub>	D <sub>6</sub>	D <sub>7</sub>	D <sub>8</sub>	D <sub>9</sub>	D <sub>10</sub>	D <sub>11</sub>	D <sub>12</sub>
Indirect Attainment	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	I <sub>4</sub>	I <sub>5</sub>	I <sub>6</sub>	I <sub>7</sub>	I <sub>8</sub>	I <sub>9</sub>	I <sub>10</sub>	I <sub>11</sub>	I <sub>12</sub>
Overall Attainment	O <sub>1</sub>	O <sub>2</sub>	O <sub>3</sub>	O <sub>4</sub>	O <sub>5</sub>	O <sub>6</sub>	O <sub>7</sub>	O <sub>8</sub>	O <sub>9</sub>	O <sub>10</sub>	O <sub>11</sub>	O <sub>12</sub>

**Overall PO and PSO Attainment**

Overall Attainment of PO<sub>i</sub> ;  $O_i = 80\% \text{ of } D_i + 20\% \text{ of } I_i$

where  $D_i$  – Direct Attainment of each PO  $I_i$  – Indirect Attainment of each PO

Similarly, PSO attainment is also evaluated.

POs	PSO1	PSO2
Direct Attainment	$D_1$	$D_2$
Indirect Attainment	$I_1$	$I_2$
Overall Attainment	$O_1$	$O_2$

Overall Attainment of PSO<sub>i</sub>;

$O_i = 80\% \text{ of } D_i + 20\% \text{ of } I_i$

Where  $D_i$  – Direct Attainment of each PSO

$I_i$  – Indirect Attainment of each PSO

## ANNEXURE

## A.SAMPLE B. Tech COURSE LIST (2015-2019)

YEAR/SEM		SUBJECT NAME	COURSE CODE
FIRST YEAR		MATHEMATICAL METHODS	A10003
		MATHEMATICS – I	A10002
		ENGINEERING PHYSICS	A10004
		ENGINEERING PHYSICS/ ENGINEERING CHEMISTRY LAB	A10081
		ENGINEERING CHEMISTRY	A10005
		ENGLISH	A10001
		ENGINEERING DRAWING	A10301
		ENGINEERING WORKSHOP	A10082
		COMPUTER PROGRAMMING	A10501
III YEAR I SEMESTER		ANALOG COMMUNICATIONS LAB	A50487
		ANALOG COMMUNICATIONS	A50408
		ANTENNAS & WAVE PROPAGATION	A50418
		COMPUTER ORGAN. AND OPERATING SYSTEMS	A50516
		CONTROL SYSTEMS ENGINEERING	A50217
		ELECTRONIC MEASUREMENTS & INSTRUMENTATION	A50422
		IC APPLICATIONS AND HDL SIMULATION LAB	A50488
		LINEAR AND DIGITAL IC APPLICATIONS	A50425
III YEAR II SEMESTER		DIGITAL COMMUNICATIONS	A60420
		DIGITAL SIGNAL PROCESSING LAB	A60493
		DIGITAL SIGNAL PROCESSING	A60421
		INTELLECTUAL PROPERTY RIGHTS	A60017
		MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	A60010
		MICROPROCESSOR AND MICROCONTROLLER	A60494
		MICROPROCESSOR AND CONTROLLER LAB	A70086
		VLSI DESIGN	A60432
IV YEAR I SEM		CELLULAR AND MOBILE COMMUNICATIONS	A70434
		COMPUTER NETWORKS	A70515
		OBJECT ORIENTED PROGRAMMING THROUGH JAVA	A70505
		MANAGEMENT SCIENCE	A70014
		MICROWAVE ENGINEERING	A70442



	OPTICAL COMMUNICATION	A70444
	ADVANCED COMMUNICATION SKILLS LAB	A70086
	MICROWAVE AND DIGITAL COMMUNICATIONS LAB	A70499
IV YEAR II SEMESTER	RS	A80450
	SC	A80450
	WCN	A80454
	COMPREHENSIVE VIVA	A80090
	MAJOR PROJECT	A80088
	INDUSTRY ORIENTED MINI PROJECT	A80087
	SEMINAR	A80089



## SREYAS Institute of Engineering & Technology

(Approved by AICTE, New Delhi) | Affiliated to JNTUH, Hyderabad | Accredited by NAAC  
Hyderabad | PIN: 500065

### ALUMNI SURVEY

<b>Name :</b>		<b>Dept :</b>	
<b>Reg No:</b>		<b>Batch :</b>	
<b>Address :</b>			
<b>E mail :</b>		<b>Mobile :</b>	

**Evaluation of Programme Effectiveness:** identify the degree to which your program helped you to develop the skills and abilities to be successful in your professional life with (a) **High-3**(b) **Moderate -2** (c) **Low-1** (d) **Poor-0**

Sno	Programme Specification	Grade
1	Application of Engineering fundamentals	
2	Problem solving capability	
3	Designing capability for specific Engineering needs	
4	Capability to conduct investigations of complex problems	
5	Usage of modern tools in engineering	
6	Engineering practice with social responsibility	
7	Understanding of development with sensitivity to environment	
8	Professional ethics in engineering practice	
9	Team work & leadership skills	
10	Effective communication	
11	Managerial skills and finance handling capability	
12	Ability to engage in independent and lifelong learning	

Sno	Suggestions	Yes/No
1	Can you suggest any technical content that would augment existing curriculum?	
2	Suggest how SREYAS can help, improve the placement opportunities for its students.	
3	Specify tools / Novel Technologies needed to meet the current job requirements.	
4	Have you received any award / recognition in your professional career?	
5	Have you published any research / technical paper in your profession?	
6	Will you recommend your relative/friends to enroll in SREYAS?	
7	Would you like to associate with the Institute / Department in any of the following ; (a) Project (UG/PG) (b) Training Students (c) Expert Lectures / Workshops (d) Consultancy (e) Industrial Visits (f) Placement (g) Industrial linkages (h) R & D	



**SREYAS Institute of Engineering & Technology**  
 (Approved by AICTE, New Delhi | Affiliated to JNTUW, Hyderabad | Accredited by NAAC)  
 Hyderabad | PIN: 500063

**Career Information**

**Placement:**

<b>Company</b>	
<b>Designation</b>	
<b>Package</b>	

**+ Higher Education**

<b>University</b>	
<b>Degree</b>	
<b>Admission No</b>	

**Entrepreneur**

<b>Industry (Small/Large Scale)</b>	
<b>No of Employees</b>	
<b>Product</b>	
<b>Investment/Budget/Capital</b>	

**Signature**



## SREYAS Institute of Engineering & Technology

(Approved by AICTE, New Delhi) | Affiliated to JNTU, Hyderabad | Accredited by MAAC

Hyderabad - PIN- 500082

### EXIT FEED BACK

Name :		Dept :	
Reg No:		Batch :	
Address :			
E mail :		Mobile :	

Identify the degree to which the facilities at SREYAS helped your ward to develop the skills and abilities to be successful in his professional life with (a) High-3 (b) Moderate -2 (c) Low-1

Sno	Information	Grade
PO 1	Application of Engineering fundamentals	
PO 2	Problem solving capability	
PO 3	Designing capability for specific Engineering needs	
PO 4	Capability to conduct investigations of complex problems	
PO 5	Usage of modern tools in engineering	
PO 6	Engineering practice with social responsibility	
PO 7	Understanding of development with sensitivity to environment	
PO 8	Professional ethics in engineering practice	
PO 9	Team work & leadership skills	
PO 10	Effective communication skills	
PO 11	Managerial skills and finance handling capability	
PO 12	Ability to engage in independent and Lifelong learning	

PEO 1	Design, Analyze and develop modules and systems for applications in advanced electronics and communication systems.	
PEO 2	Utilize modern tools for modeling and computational techniques in IC fabrication and RF technologies	

PEO 1	Graduates will be empowered with strong fundamental concepts, analytical capability, programming and problem solving skills.	
PEO 2	Graduates will be employed, may pursue higher education or undertake research	
PEO 3	Graduates will embrace Professional Career Growth with Values & Ethics and urge for lifelong learning.	

Sno	Facility	Grade	Sno	Facility	Grade
1	Class rooms		6	Medical	
2	Laboratory infrastructure		7	Transport	
3	Sports and cultural facilities		8	Mentoring	
4	Research		9	Grievances handled	
5	Library		10	Placement opportunities	

Signature

**SAMPLE ATTAINMENT SHEET**

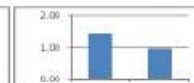
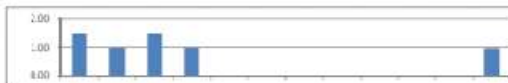
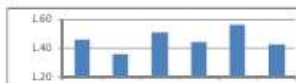
COURSE TITLE	<b>SIGNALS AND SYSTEMS</b>	COURSE CODE	<b>103BT</b>
NAME & DESIGNATION	<b>J.PANDU RANGA RAO ( PROFESSOR )</b>	SECTION	<b>A, B, C &amp; D</b>
NAME & DESIGNATION		SECTION	
DEPARTMENT	<b>ECE</b>	REGULATION	<b>R10</b>
BATCH	<b>2019-2021</b>	YEAR & SEMESTER	<b>II-I</b>
ACADEMIC YEAR	<b>2021</b>		

COURSE NAME	COURSE OUTCOMES	CPD	HOURS
C421.1	To understand signal types of signals, analogy between vectors and signals, response of LTI system.	TL3	8
C421.2	To determine the Fourier series for continuous time and different types of series, to analyze the Fourier transform for standard signals and Hilbert	TL2	12
C421.3	To understand Characteristics of filters, relation between the bandwidth and rise time, convolution in time and frequency domain	TL3	9
C421.4	To apply the LT and IIT and to find the ROC for different types of signals and the relation between the LT and FT.	TL4	7
C421.5	To apply the ZT and IZT for discrete time signals and to find the ROC of ZT, of different types of signals.	TL2	7
C421.6	To understand the concepts of sampling, Cross Correlation and Autocorrelation .	TL2	13

COURSE TITLE	LECTURE	TUTORIAL	PRACTICE	HOURS	CREDITS	CO-1-T	CO-2-T	CO-3-T	CO-4-T	CO-5-T	CO-6-T	CO-5-A	CO-2-A	CO-3-A	CO-4-A	CO-5-A	CO-5-A
<b>SIGNALS AND SYSTEMS</b>	4	0	0	62	4	2.20	1.92	1.92	1.92	2.20	2.20	1.46	1.97	1.97	1.44	1.97	1.42

CO-PO MAPPING	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C421.1	X	X	X	X	-	-	-	-	-	-	-	X	X	I
C421.2	X	X	X	X	-	-	-	-	-	-	-	X	X	I
C421.3	X	X	X	X	-	-	-	-	-	-	-	X	X	I
C421.4	X	X	X	X	-	-	-	-	-	-	-	X	X	I
C421.5	X	X	X	X	-	-	-	-	-	-	-	X	X	I
C421.6	X	X	X	X	-	-	-	-	-	-	-	X	X	I
<b>C421_PO MAP</b>	X	X	X	X	-	-	-	-	-	-	-	X	X	I

C_PO ATTAINMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	CO_ATT
C421.1	3	1	1	1	0	0	0	0	0	0	0	2	2	1	1.46
C421.2	3	2	2	1	0	0	0	0	0	0	0	2	2	1	1.96
C421.3	3	2	1	1	0	0	0	0	0	0	0	1	2	1	1.51
C421.4	3	2	1	1	0	0	0	0	0	0	0	1	2	1	1.44
C421.5	3	2	1	1	0	0	0	0	0	0	0	1	2	1	1.57
C421.6	3	2	2	1	0	0	0	0	0	0	0	1	2	1	1.42
<b>C421_PO MAP (I)</b>	3	2	1	2	0	0	0	0	0	0	0	2	3	2	<b>1.46</b>
<b>C421_PO ATTAINMENT</b>	1.46	0.97	1.47	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.97	1.46	0.97	



PRE REQUISITES	GAPS IF ANY	ACTION TAKEN	DATE	RESOURCE PERSON	%ST ATTENDED	RELEVANCE TO Pos

	CO1	CO2	CO3	CO4	CO5	CO6
Domain Expert Feedback	2	1	1	1	2	2
Student Feedback	2.49	2.49	2.49	2.49	2.49	2.49
University Results	1.5	1.5	1.5	1.5	1.5	1.5
Average	2.00	1.66	1.66	1.66	2.00	2.00
Enhancement %	10	2.2	1.8	1.8	2.2	2.2

UNI	CO	LNO	TOPIC	COURSE OBJECTIVES	COURSE OUTCOMES	KEY NO:	KEY WORD
<b>UNIT - I - Signal Analysis :</b>							
UNIT - 1	CO - 1	1	Analogy between Vectors and Signals	This gives the basics of Signals and Systems required for all Electrical Engineering related courses.	To understand signal, types of signals, analogy between vectors and signals, response of LTI system.	1	Signals
		2	Orthogonal Signal Space			2	Vector
		3	Signal approximation using Orthogonal functions			3	Orthogonal Functions
		4	Mean Square Error				
		5	Closed or complete set of Orthogonal functions				
		6	Orthogonality in Complex functions				
		7	Classification of Signals				
		8	Classification of systems				
		9	Exponential and Sinusoidal signals				
		10	Concepts of Impulse function				
		11	Concepts of Unit Step function, Signum function				
		12	Concepts of Signum function				
<b>UNIT - II - Fourier Transforms &amp; Fourier Series:</b>							
UNIT - 2	CO - 2	1	Exponential Fourier Series, Complex Fourier spectrum	To understand the behavior of signal in time and frequency domain	To determine the Fourier series for continuous time and different types of series, to analyze the Fourier transform for standard signals and Hilbert Transform.	1	Fourier Series
		2	Properties of Fourier Series			2	Fourier Transform
		3	Introduction Fourier Transform			3	Hilbert Transform
		4	Deriving Fourier Transform from Fourier Series				
		5	Fourier Transform of standard signals,				
		6	Fourier Transform of Periodic Signals				
		7	Properties of Fourier Transform				
		8	Hilbert Transform				
<b>UNIT - III -Signal Transmission through Linear Systems:</b>							
UNIT - 3	CO - 3	1	Introduction of Linear System, Impulse response,	To understand the characteristics of LTI systems	To understand Characteristics of LTI Systems	1	LTI System
		2	Response of a Linear System, Linear Time Invariant (LTI) System			2	Filter Characteristics
		3	Transfer function of a LTI system			3	Distortion less system
		4	Filter characteristics of Linear Systems				
		5	Distortion less transmission through a system				
		6					
		7					
	CO - 4	8	Signal bandwidth, System bandwidth and Ideal LPF, HPF and BPF		To understand Characteristics of filters and convolution in time and frequency domain	1	Causality
		9	Causality and Paley-Wiener criterion for physical realization,			2	Band width
		10	Relationship between Bandwidth and Rise time.			3	Rise time
		11					
		12					
13							
14							
15							
<b>UNIT-IV: Laplace Transforms and Z-Transforms: Laplace Transforms:</b>							
UNIT - 4	CO - 3	1	Review of Laplace Transforms (L.T)	To understand the concepts of Signals and Systems and its analysis using different transform	To apply the LT & ZT for Continuous & discrete time signals	1	Laplace Transform
		2	Concept of Region of Convergence (ROC) for Laplace Transforms			2	Z Transform
		3	Properties of L.T			3	ROC
		4	certain signals using waveform synthesis				
		5	signals				
		6	Partial fraction expansion				
		7	Inverse Laplace Transform				
		8	Sinusoidal components				
		9	Periodicity of Discrete time signal using complex exponential signal				
		10	Concept of Z-Transform of a Discrete Sequence				
		11	is Z-Transform				
		12	Inverse Z-transform				
		13	Properties of Z-transforms				
<b>UNIT-V Sampling Theorem &amp; Correlation:</b>							
UNIT - 5	CO - 5	1	Impulse	To understand the concepts of Sampling, its analysis using different methods, Cross Correlation and Autocorrelation	To understand the concepts of sampling ,Cross Correlation and Autocorrelation	1	Sampling
		2	Sampling ,Natural and Flat top Sampling			2	Auto Correlation
		3	Reconstruction of signal from its samples			3	Cross Correlation
		4	Effect of under sampling - Aliasing				
		5	Introduction to Band Pass Sampling				
		6	Cross Correlation				
		7	Auto Correlation of Function:				
		8	Properties of Correlation Functions				
		9	Energy Density Spectrum				
		10	Parseval's Theorem				
		11	Power Density Spectrum				
		12	Relation between Autocorrelation Function and Energy Spectral Density Function				
		13	Relation between Autocorrelation Function and Power Spectral Density Function				
		14	Relation between Convolution and Correlation				
		15	Correlation				
		16	Extraction of Signal from Noise by Filtering				



KEY WORDS	CO1			CO2			CO3		CO4			CO5			CO6				
	Signals	Vector	Differential Equ	Fourier Series	Fourier Transform	Laplace Transform	LTI System	Wave Characteristics	Quantization	Capacity	Bandwidth	Noise	Laplace Transform	Z Transform	IDC	Sampling	Auto Correlation	Cross Correlation	
PO1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PO2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PO3	0	0	3	0.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PO4	1	1	1	1.00	1	1	1	1.00	1	1	1	1.00	1	1	1	1	1	1	1
PO5	0	0	3	0.00	0	0	0	0.00	0	0	0	0.00	0	0	0	0	0	0	0
PO6	0	0	3	0.00	0	0	0	0.00	0	0	0	0.00	0	0	0	0	0	0	0
PO7	0	0	3	0.00	0	0	0	0.00	0	0	0	0.00	0	0	0	0	0	0	0
PO8	0	0	3	0.00	0	0	0	0.00	0	0	0	0.00	0	0	0	0	0	0	0
PO9	0	0	3	0.00	0	0	0	0.00	0	0	0	0.00	0	0	0	0	0	0	0
PO10	0	0	3	0.00	0	0	0	0.00	0	0	0	0.00	0	0	0	0	0	0	0
PO11	0	0	3	0.00	0	0	0	0.00	0	0	0	0.00	0	0	0	0	0	0	0
PO12	1	1	1	1.00	1	1	1	1.00	1	1	1	1.00	1	1	1	1	1	1	1
PSO1	1	1	1	1.00	1	1	1	1.00	1	1	1	1.00	1	1	1	1	1	1	1
PSO2	1	1	1	1.00	1	1	1	1.00	1	1	1	1.00	1	1	1	1	1	1	1

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C215.1	3	1	1	1	0	0	0	0	0	0	0	2	2	1
C215.2	3	2	2	1	0	0	0	0	0	0	0	2	2	1
C215.3	3	2	3	1	0	0	0	0	0	0	0	1	2	1
C215.4	3	2	3	1	0	0	0	0	0	0	0	1	2	1
C215.5	3	2	3	1	0	0	0	0	0	0	0	1	2	1
C215.6	3	2	2	1	0	0	0	0	0	0	0	1	2	1
SUM	18	11	14	6	0	0	0	0	0	0	0	8	12	6

	CO1	CO2	CO3	CO4	CO5	CO6
PO1	3	3	3	3	3	3
PO2	1	2	2	2	2	2
PO3	1	2	3	3	3	2
PO4	1	1	1	1	1	1
PO5	0	0	0	0	0	0
PO6	0	0	0	0	0	0
PO7	0	0	0	0	0	0
PO8	0	0	0	0	0	0
PO9	0	0	0	0	0	0
PO10	0	0	0	0	0	0
PO11	0	0	0	0	0	0
PO12	1	2	1	1	1	1
PSO1	1	2	2	2	2	2
PSO2	1	1	1	1	1	1

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	CO_A
C215.1	3	1	1	1	0	0	0	0	0	0	0	2	2	1	1.46
C215.2	3	2	2	1	0	0	0	0	0	0	0	2	2	1	1.36
C215.3	3	2	3	1	0	0	0	0	0	0	0	1	2	1	1.51
C215.4	3	2	3	1	0	0	0	0	0	0	0	1	2	1	1.44
C215.5	3	2	3	1	0	0	0	0	0	0	0	1	2	1	1.57
C215.6	3	2	2	1	0	0	0	0	0	0	0	1	2	1	1.42
CO_POI	3	2	3	2	0	0	0	0	0	0	0	2	3	2	
C_POI	1.46	0.97	1.47	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.97	1.46	0.97	

SUM F(A, CO, POI)
0
1-3
4-11
12-11

S.No	Hall Ticket No.	Student Name	Descriptive Question Wise Marks												DES (10)	OBJ (10)	ASN (5)	MID (25)
			Q1			Q2			Q3			Q4						
			CU1	CU2	CU3	CU1	CU2	CU3	CU1	CU2	CU3	CU1	CU2	CU3				
			A	B	C	A	B	C	A	B	C	A	B	C				
1	19VE1A0400	JONNADA NITHIN RAI	0												0	1	5	5
2	19VE1A0401	AJAY PRANEETH VETURI	0.5		1	0.5									2.5	1	5	9
3	19VE1A0402	AKSHITHA VFFRANKI	0.5	1	0.5							0.5	1		4	3	5	12
4	19VE1A0403	ALIGOLU MANASA	2	2	0.5	1	0	1	2	1	0	1	1	0.5	10.5	4	5	20
5	19VE1A0404	ALLAM SURESH	0.5	0	0.5										1	3	5	9
6	19VE1A0405	ANNAMDAS SONY SRILEKHA	1	1	0.5							1	0	0.5	5.5	3	5	14
7	19VE1A0406	BOMMAKODURI SAIKETH											1		2	2	5	9
8	19VE1A0407	C SATYA SAI SIDDARATHA												0	0	2	5	7
9	19VE1A0400	C V R KOUJIBIKI												0	0	1	5	6
10	19VE1A0409	CHALLA SAI NITHIN VARDHAN REDDY		1	0.5									0.5	2	1	5	8
11	19VE1A0410	CHIMMALA RAJEDI												0	0	1	5	6
12	19VE1A0411	DHARAVATH GANDHI	2	1					1					0	5	2	5	12
13	19VE1A0412	EBA BATHWIKA	1	2								1	1		7	2	5	14
14	19VE1A0413	ENUGU KRUTI				0.5	2	1				2	2	0.5	12.5	5	5	23
15	19VE1A0414	ERUPAKA AKHILA	1	1	0.5							0.5	1	0.5	5.5	3	5	14
16	19VE1A0415	GADIPARTHI NITESH CHOWDARY	0.5	0	1				1			1	0	0.5	4.5	3	5	13
17	19VE1A0416	GANDHARI LUDRY KUMAR												0.5	1	1	5	7
18	19VE1A0417	GANGAPURAM VISHAL	0.5			1	1					1	1		5.5	3	5	14
19	19VE1A0418	GANJI ESHWAR SAI	0.5									1			2.5	3	5	11
20	19VE1A0419	GARDAS UDAY KIRAN												0	0	1	5	6
21	19VE1A0420	GARUGU SRIKAR										0.5	1	0.5	3	3	5	11
22	19VE1A0421	GODI VIS-HNU VARDHAN REDDY												0	0	2	5	7
23	19VE1A0422	GOPATHI SREE SHAKTHEESWARI	0.5	0	1							2	0	1	7.5	5	5	18
24	19VE1A0423	GUNDU SAI KRISHNA REDDY	0.5	0					1					0	2.5	3	5	11
25	19VE1A0424	KAMATHAM SAI NITHYA												0	0	2	5	7
26	19VE1A0425	KANCHUKATLA SHIVANI	1	2	1							2	1	1	11	2	5	18
27	19VE1A0426	KEERTHI SHARMA TELKAPALLY	0.5						1			1			3	3	5	11
28	19VE1A0427	KUNCHALA GOPI CHANE										1	1		3	3	5	11
29	19VE1A0428	LAGUDU SHRUTHI	2	2	1							2	2	1	15	4	5	24
30	19VE1A0429	MASHAPARI ADARSH	0.5				1					0.5	1		4	5	5	14
31	19VE1A0430	MALKAPURAM AASHISH	2	1										0	3	3	5	11
32	19VE1A0431	MANDA AKASH REDDY	1									2		1	7	0	5	12
33	19VE1A0432	MANGALAGIRI ASHWITHA												1	2	1	5	8
34	19VE1A0433	MEDDLA -HARIKA	1	2								0.5	1		6	1	5	12
35	19VE1A0434	MIDIDODDA NAVYA SAI VINEETH	1	2	1							1	1	1	10	3	5	18
36	19VE1A0435	MOVVA DEEKSHITHA	1.5	2								2			7.5	5	5	18
37	19VE1A0436	NAMPALLI RITHIKA	0.5		0.5	1			1			0.5	0.5		3	3	5	11
38	19VE1A0437	NARAYANA NIKHITHA REDDY	2	2	1							2	2	1	15	4	5	24
39	19VE1A0438	NISHITHA CHITTANURI	1	2	1							1	1	1	10	4	5	19
40	19VE1A0439	P KAVYA REDDY	2	2	1	2	1.5	0.5							13	4	5	22
41	19VE1A0440	PALNATI AKANKSHA	2	1	1	0.5		0.5				2		1	9.5	5	5	20
42	19VE1A0441	PERVALA SINGDHA	0.5	1	0.5							1		0.5	5	3	5	13
43	19VE1A0442	POOJARLA PAVAN TEJA	0.5	1	0.5							1			3.5	2	5	11
44	19VE1A0443	POTI IANA SINDHU	0.5	1	0.5										1.5	3	5	10
45	19VE1A0444	RACHAKONDA AAKASH	2	2										2	8	2	5	15
46	19VE1A0445	RAMOJU SHILPA	2	2	1	2	2	1							15	4	5	24
47	19VE1A0446	RENDUCHINTALA SAI SOWMYA	0.5		0.5										1	2	5	8
48	19VE1A0447	RUDRARAJU VARSHA				1		1	1	1		2	1	0.5	8	2	5	15
49	19VE1A0448	S RUCHITHA	1		1	2	0.5	1	1					0.5	9	2	5	16
50	19VE1A0449	SAIBELLA SAILEELA	1	1		2	1	1	0.5						10	2	5	17
51	19VE1A0450	SALVERL AKHILA	2						0.5	1					4	1	5	10
52	19VE1A0451	SAPPHIJI SOHAN REDDY		1	0.5				1						3	2	5	10
53	19VE1A0452	SINGARAM MANIK REDDY	2	1								0.5	1	0.5	5.5	4	5	15
54	19VE1A0453	SPANDANA PAM											1	0.5	2	5	5	12
55	19VE1A0454	SUMANTH VADLA	1	1	1	1	2					0.5	1	0.5	9	4	5	18
56	19VE1A0455	SURAKANTI MALAVIKA	1		0.5			0.5	0.5			1	1	0.5	5.5	3	5	14
57	19VE1A0456	THUMRUGOTI GODHA SREE	0.5		0.5	1	0.5	1							6	4	5	15
58	19VE1A0457	VUTUKURI BHUVAN CHANDRA	0.5		0.5							0.5	1		3	3	5	11
59	19VE1A0459	VUDDAWAR HRISHIKESH JOSHI		1	0.5				1						3	4	5	12
60	19VE1A0460	YEDULLA PREETHI	2	2	1	1	1	1							11	5	5	21
61	19VE5A0409	ERRA BHAVANI	0.5						2	2		1		0.5	9.5	3	5	18
62	20VE5A0401	CHANDRAPATI SRI POOJITHA		1	0.5	0.5		0.5				1	1	0.5	5.5	4	5	15
63	20VE5A0402	DAYAMULLAH SHAREEF				0.5		0.5	2			1	1		6	3	5	14
64	20VE5A0403	DUBBA HARITHA	0.5	1	0.5										1.5	3	5	10
65	20VE5A0404	NADIMPALLY AJAY	1												1	3	5	9
66	20VE5A0405	P NARSIMHA				1	1	1				0.5	2	1	10	7	5	22
67	20VE5A0406	PANTHANGI PRAVALIKA			1										1	2	5	8
68	18VE1A0482	KANDURI SRIKAR	0												0	0	5	5
69	19VF1A0461	AELLA SNIKITHA	1	2	1							2	2	1	14	3	5	22
70	19VE1A0462	ALLOJU HARISH	1	2	0.5							1	1	1	9	4	5	18



		Descriptive Question Wise Marks																	GRAD E		
Hall Ticket No.	Student Name	Q1			Q2			Q3			Q4			II DES (10)	II OBJ (10)	II ASN (5)	II MID (25)	Intern al (25)		Extern al (75)	
		CO4	CO5	CO6	CO4	CO5	CO6	CO4	CO5	CO6	CO4	CO5	CO6								
		A	B	C	A	B	C	A	B	C	A	B	C								
18VE1A04E0	JONNADA NITIN RAJ	2	2	1	2	2	1	2	2	1	2	2	1	6	5	5	16	11	5	F	
19VE1A0401	AJAY PRANEETH	2	2	1			2	1						8	4	5	17	13	28	C	
19VE1A0402	AKSHITHA VEERANKI	2	2	1			2	1						8	5	5	18	15	37	B	
19VE1A0403	ALIGOLU MANASA	2	2	1	0.5	2	1							8.5	3	5	17	18.5	40	B	
19VE1A0404	ALLAM SURESH	2	2				2	1						7	5	5	17	13	16	F	
19VE1A0405	ANNAMDAS SONY	2	2	1	0.5	2	1							8.5	5	5	19	16.5	27	C	
19VE1A0406	BOMMAKOORI	2	2	1						2				7	4	5	16	12.5	17	F	
19VE1A0407	C SATYA SAI	2	2							2				6	5	5	16	11.5	27	C	
19VE1A0408	C V R KOUSHIK		1			0.5	0.5							1.5	4	5	11	8.5	12	F	
19VE1A0409	CHALLA SAI NITHIN	2	1				0.5			1				4	4	5	13	10.5	9	F	
19VE1A0410	CHIMALA RAJESH	1	2					1						4	5	5	14	10	6	F	
19VE1A0411	DHARAVATH GANDHI		2				2	1						5	7	5	17	14.5	0	F	
19VE1A0412	EGA SATHWIKA														0	5	5	9.5	-1	Ab	
19VE1A0413	ENUGU KRUTI	2	2	1	2	2	1							10	6.5	5	22	22.5	26	C	
19VE1A0414	ERUPAKA AKHILA	2	2	1	2	2	1							10	6.5	5	22	18	11	F	
19VE1A0415	GADIPARTHI NITESH	2	2	1	2	2	1							10	7	5	22	17.5	12	F	
19VE1A0416	GANDHAM UDAY	2	2	1	2	2	1							10	7	5	22	14.5	13	F	
19VE1A0417	GANGAPURAM	2	2	1					2		1		2	8	7.5	5	21	17.5	26	C	
19VE1A0418	GANJI ESHWAR SAI	2	2	1			2			2				7	6	5	18	14.5	7	F	
19VE1A0419	GARDAS UDAY KIRAN	2	2								2	2	1	9	6	5	20	13	26	C	
19VE1A0420	GARUGU SRIKAR	2	2				2	1		2				7	7.5	5	20	15.5	17	F	
19VE1A0421	GODI VISHNU	2	2				2	1						7	8	5	20	13.5	30	C	
19VE1A0422	GOPATHI SREE	2	2	1								2	1	8	7.5	5	21	19.5	39	B	
19VE1A0423	GUNDU SAI KRISHNA	2	2	0.5						2				6.5	6.5	5	18	14.5	8	F	
19VE1A0424	KAMATHAM SAI	2	2				1	1		2			2	6	3.5	5	15	11	6	F	
19VE1A0425	KANCHUKATLA	2	2	1							2	2	1	10	4.5	5	20	19	6	F	
19VE1A0426	KEERTHI SHARMA	2	2	1				1		1			1	8	4	5	17	14	7	F	
19VE1A0427	KUNCHALA GOPI	2		1			2	1		1				6	3.5	5	15	13	5	F	
19VE1A0428	LAGUDU SHRUTHI					1	2	1	2	2				8	5	5	18	21	32	B	
19VE1A0429	MASHAPARI ADARSH	2	2								2			6	5	5	16	15	0	F	
19VE1A0430	MALKAPURAM	2		1			2	1					2	6	5	5	16	13.5	15	F	
19VE1A0431	MANDA AKASH	2	2				2						1	6	6	5	17	14.5	17	F	
19VE1A0432	MANGALAGIRI	2					2			2			1	4	4	5	13	10.5	0	F	
19VE1A0433	MEDDLA HARIKA	1	2	1			2	1		2			2	7	4	5	16	14	9	F	
19VE1A0434	MIDIDODDA NAVYA	1		1			2	1				2		5	5	5	15	16.5	16	F	
19VE1A0435	MOVVA DEEKSHITHA	2	2							2	1			7	3	5	15	16.5	15	F	
19VE1A0436	NAMPALLI RITHIKA	2	2	1	2	2	1							10	4	5	19	15	30	C	
19VE1A0437	NARAYANA	2	2	1	2		1							8	6	5	19	21.5	33	B	
19VE1A0438	NISHITHA	2	2	1	1	2	1							9	7	5	21	20	26	C	
19VE1A0439	P KAVYA REDDY	2	2	1			2	1						8	4	5	17	19.5	32	B	
19VE1A0440	PALNATI AKANKSHA	1	2	1						2	1			7	6	5	18	19	17	F	
19VE1A0441	PERVALA SNI GDHA	2	2	1			2			2	1		2	8	3	5	16	14.5	17	F	
19VE1A0442	POOJARLA PAVAN	2	2		0.5			1						5.5	6	5	17	14	13	F	
19VE1A0443	POTHANA SINDHU	2	1			1	2	1						7	3	5	15	12.5	10	F	
19VE1A0444	RACHAKONDA						2	1					2	5	5	5	15	15	10	F	
19VE1A0445	RAMOJU SHILPA	2	2	1							2	2	1	10	6	5	21	22.5	34	B	
19VE1A0446	RENDUCHINTALA SAI	1	1	1						1				3.5	3	5	12	10	0	F	
19VE1A0447	RUDRARAJU VARSHA	2		1	1	2	1	2		1				7	4	5	16	15.5	26	C	
19VE1A0448	S RUCHITHA	2	2	1	0.5	2	1							8.5	4	5	18	17	26	C	
19VE1A0449	SAIELLA SAILEELA	2	2	1	0.5	2	1							8.5	5	5	19	18	34	B	
19VE1A0450	SALVERU AKHILA	2	2								2	1		7	5	5	17	13.5	29	C	
19VE1A0451	SAPPIDI SOHAN	1	2							2				5	4	5	14	12	26	C	
19VE1A0452	SINGARAM MANIK	2	2				1	1						6	5	5	16	15.5	26	C	
19VE1A0453	SPANDANA PAM	1		0.5			2	1		1				4.5	5	5	15	13.5	26	C	
19VE1A0454	SUMANTH VADLA	2	2				2	1	0.5					7	5	5	17	17.5	44	B+	
19VE1A0455	SURAKANTI	2	2			1	2	1					2	8	3	5	16	15	27	C	
19VE1A0456	THUMRUGOTI	2	2		0.5			1						5.5	6	5	17	16	9	F	
19VE1A0457	VUTUKURI BHUVAN	0.5	1				1	1		2			1	4	5	5	14	12.5	26	C	
19VE1A0459	UDDAWAR						2			2				4	5	5	14	13	26	C	
19VE1A0460	YEDULLA PREETHI	2	2									2	2	1	9	4	5	18	19.5	30	C
19VE5A0409	ERRA BHAVANI	2	2				1	1						6	2	5	13	15.5	26	C	
20VE5A0401	CHANDRAPATI SRI	2	2				2	1		2				7	5	5	17	16	30	C	
20VE5A0402	DAYAMULLAH	2					1	1		2		2		4	7	5	16	15	6	F	
20VE5A0403	DUBBA HARITHA	1	1				2	1		2			2	5	2	5	12	11	7	F	
20VE5A0404	NADIMPALLY AJAY		2				2	1		1				5	2.5	5	13	11	26	C	
20VE5A0405	P NARSIMHA	2	2	1	2	2	1							10	7	5	22	22	33	B	
20VE5A0406	PANTHANGI		2				1							3	3	5	11	9.5	19	F	
18VF1A0482	KANDIURI SRIKAR	0												0	0	5	5	5	5	Ab	
19VE1A0461	AELLA SNIKITHA	2	2						2	2	1			9	7.5	5	22	22	21	F	
19VE1A0462	ALLOJU HARISH	2		0.5			2			1.5	2	1	2	0.5	7	3.5	5	16	17	28	F

	CO1	CO2	CO3	CO1	CO2	CO3	CO1	CO2	CO3	CO1	CO2	CO3
Total Marks	216.5	203	113.5	93.5	73.5	47.5	65	35	2.5	159.5	122	79
No of Students Answered	203	150	157	71	59	60	55	30	5	128	103	131
No of Students scoring > threshold	139	116	157	59	50	60	41	24	4	99	74	117
% of students scoring > threshold	68.5	77.3	100.0	76.1	84.7	100.0	74.5	80.0	80.0	77.3	71.8	89.3

	CO4	CO5	CO6	CO4	CO5	CO6	CO4	CO5	CO6	CO4	CO5	CO6
	424	387	127.5	58.5	238.5	96	86.5	201	57	52	133	34.5
	228	202	135	44	132	100	52	110	60	28	71	38
	216	196	134	31	125	100	44	103	60	26	69	38
	94.74	97	99.26	70.45	94.7	100	84.62	94	100	92.86	97	100

	A	B	C	A	B	C	A	B	C	A	B	C	10M	5M	25M	
MID 1-INTERNAL	50	1	1	0.5	1	1	0.5	1	1	0.5	1	1	0.5	5	2.5	12.5
MID 2-INTERNAL THRESHOLD	50	1	1	0.5	1	1	0.5	1	1	0.5	1	1	0.5	5	2.5	12.5
EXTERNAL THRESHOLD	40	30														

CO ATTAINMENT	DES	OBJ	ASN	DES	OBJ	ASN	INT	EXT	DIRECT	INDIRECT	CO_ATT	INT %	25	TARGET
CO1	74.1	17.7	100.0	3	0	3	1.80	1	1.20	2.49	1.46	EXT %	75	2.195
CO2	78.5	17.7	100.0	3	0	3	1.80	1	1.20	2.00	1.36			1.828
CO3	92.3	17.7	100.0	3	0	3	1.80	1	1.20	2.77	1.51	DIRECT %	80	1.828
CO4	85.7	43.8	100.0	3	1	3	2.20	1	1.30	2.00	1.44	INDIRECT %	20	1.828
CO5	95.6	43.8	100.0	3	1	3	2.20	1	1.30	2.63	1.57			2.195
CO6	99.8	43.8	100.0	3	1	3	2.20	1	1.30	1.92	1.42			2.195
COURSE OVERALL CO ATTAINMENT (AVERAGE)											1.46			2.01

% RANGE	LEVEL
<40%	0
40% to 50%	1
50% to 60%	2
>60%	3

MID -1											
CO1	CO2	CO3	CO1	CO2	CO3	CO1	CO2	CO3	CO1	CO2	CO3
68.5	77.3	100.0	76.1	84.7	100.0	74.5	80.0	80.0	77.3	71.8	89.3
MID-2											
CO4	CO5	CO6	CO4	CO5	CO6	CO4	CO5	CO6	CO4	CO5	CO6
94.7	97.0	99.3	70.5	94.7	100.0	84.6	93.6	100.0	92.9	97.2	100.0

CO1	74.1
CO2	78.48
CO3	92.33
CO4	85.67
CO5	95.64
CO6	99.81

S.No	Hall Ticket No.	CO1	CO2	CO3	CO4	CO5	CO6
1	18VE1A04E0	3	2	1	2	2	2
2	19VE1A0401	3	2	1	2	2	2
3	19VE1A0402	3	2	1	2	2	2
4	19VE1A0403	3	2	1	2	2	2
5	19VE1A0404	3	2	1	2	2	2
6	19VE1A0405	3	2	1	2	2	0
7	19VE1A0406	3	2	1	2	2	0
8	19VE1A0407	3	2	1	2	2	2
9	19VE1A0408	3	2	1	2	2	2
10	19VE1A0409	3	2	1	2	2	2
11	19VE1A0410	3	2	1	2	2	2
12	19VE1A0411	3	2	1	2	2	2
13	19VE1A0412	3	2	1	2	2	2
14	19VE1A0413	3	2	1	2	2	2
15	19VE1A0414	3	2	1	2	2	2
16	19VE1A0415	1	2	3	2	2	2
17	19VE1A0416	1	2	3	2	2	2
18	19VE1A0417	1	2	3	2	2	2
19	19VE1A0418	1	2	3	2	2	2
20	19VE1A0419	1	2	3	2	2	2
21	19VE1A0420	1	2	3	2	2	2
22	19VE1A0421	1	2	3	2	2	2
23	19VE1A0422	1	2	3	2	2	2
24	19VE1A0423	1	2	3	2	2	1
25	19VE1A0424	1	2	3	2	2	1
26	19VE1A0425	1	2	3	2	2	2
27	19VE1A0426	1	2	3	2	2	2
28	19VE1A0427	1	2	3	2	2	2
29	19VE1A0428	1	2	3	2	2	1
30	19VE1A0429	1	2	3	2	2	2
31	19VE1A0430	1	2	3	2	2	2
32	19VE1A0431	1	2	3	2	2	2
33	19VE1A0432	1	2	3	2	2	1
34	19VE1A0433	1	2	3	2	2	2
35	19VE1A0434	1	2	3	2	2	2
36	19VE1A0435	1	2	3	2	2	2
37	19VE1A0436	1	2	3	2	2	2
38	19VE1A0437	1	2	3	2	2	2
39	19VE1A0438	1	2	3	2	2	2
40	19VE1A0439	1	2	3	2	2	1
41	19VE1A0440	1	2	3	2	2	2
42	19VE1A0441	1	2	3	2	2	2
43	19VE1A0442	1	2	3	2	2	2
44	19VE1A0443	1	2	3	2	2	2
45	19VE1A0444	1	2	3	2	2	2
46	19VE1A0445	1	2	3	2	2	1



4/2	AVG	2.49	2.00	2.77	2.00	2.63	1.92
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CO1	2.49
CO2	2.00
CO3	2.77
CO4	2.00

CO5	2.63
CO6	1.92

DATE:	Mid-1 Question Paper - Descriptive	Marks	CO	Cognitive Process Dimension
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Answer any two of the following:

1	a)	Write a note on orthogonal signal space?	2 Marks	CO-1	BTL-4
	b)	State and prove the time reversal and time shifting property?	2 Marks	CO-2	BTL-2
	c)	Define and explain time variant system with the example?	1 Mark	CO-3	BTL-1
2	a)	Explain the concept of real exponential function?	2 Marks	CO-1	BTL-2
	b)	Find the four transform of symmetrical gate function of amplitude 1 and width is T?	2 Marks	CO-2	BTL-2
	c)	Write notes on Distortionless Transmission line ?	1 Mark	CO-3	BTL-3
3	a)	A Rectangular Function is defined as Approximate the above function by a single sinusoid sint between the intervals (0,2π).Apply the mean square error in this approximation.	2 Marks	CO-1	BTL-2
	b)	Derive the coefficients of the trigonometric Fourier series?	2 Marks	CO-2	BTL-2
	c)	Write notes on paley wiener criteria.	1 Mark	CO-3	BTL-1
4	a)	Derive the Equation for Mean square Error	2 Marks	CO-1	BTL-2
	b)	Find the Fourier Transform of a single sided exponential and Draw the Magnitude & Phase Spectrum	2 Marks	CO-2	BTL-2
	c)	Define and explain unstable system with the example?	1 Marks	CO-3	BTL-2

Mid-2 Question Paper - Descriptive

Answer any two of the following:

1	a)	State and prove the properties of ROC of Laplace Transform	2 Marks	CO3	BTL - 3
	b)	State and Prove Sampling Theorem for baseband signals.	2 Marks	CO4	BTL - 2
	c)	Find the Convolution of the following signals are given as $x(t) = e^{-3t} u(t)$ and $h(t) = u(t)$	1 Mark	CO6	BTL - 2
2	a)	Find the Z- transform and sketch their ROC of i) $x(n)=u(n)$ ii) $x(n)=e^{j\omega n}u(n)$	2 Marks	CO6	BTL - 6
	b)	State and prove the properties of Energy spectral density.	2 Marks	CO2	BTL - 2
	c)	Derive the relation between rise time and bandwidth?	1 Mark	CO2	BTL - 2
3	a)	Find the inverse Z-Transform of using power series expansion method?	2 Marks	CO6	BTL - 6
	b)	State and prove properties of Auto Correlation Function	2 Marks	CO6	BTL - 6
	c)	Find the convolution of the following signals are given as $x(t) = e^{-4t} u(t)$ and $h(t) = e^{-2t} u(t)$	1 Mark	CO1	BTL - 1
4	a)	Find the inverse Laplace transform of $F(s)=6s^2+8s+5s / (2s^2+6s+5)$	2 Marks	CO3	BTL - 3
	b)	State and prove the properties of power spectral density.	2 Marks	CO5	BTL - 6

Find the Convolution of the following signals are given as  $x(t) = e^{-3t} u(t)$  and  $h(t) = e^{-2t} u(t)$ .

1 Mark

CO6

BTL - 1

### Bloom's Taxonomy

