Attainment of Programme outcomes and course outcomes evaluated by the institution

SUMMARY

Principal

PRINCIPAL
SREYAS INSTITUTE OF ENGG.&TECH.
9-39, Sy.No: 107, Tattiannaram (V),
GSI, Bandlaguda, Nagole, Hyd-68.

CO – PO / PSO ASSESSMENT

AND

ATTAINMENT PROCESS

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.

1. DEPARTMENT VISION AND MISSION

Department of 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.

Department of Mechanical Engineering

VISION

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

MISSION

- 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.

Department of Computer Science and 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

Department of 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.

MISSION

- Providing quality education to the students and enhancing their skills to make them globally sustainable civil Engineers,
- Providing state of the art laboratory and research facilities to the students and faculty with opportunities to create, interpret, apply and disseminate practical knowledge.
- To promote innovative and original thinking in the minds of budding engineers to face the challenges of future
- Interact with industry to integrate R&D activities along with academic learning to engineer in response to the change requirement, needs of the society and industry.

2. 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.

STATEMENTS OF PEOs, POs AND PSOs

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

PEO1-CORE PROFICIENCY:

Graduate 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. Inputs are also obtained from alumni and other stakeholders.

The process steps followed for establishing the PEO's for B. Tech program are illustrated in the flow chart

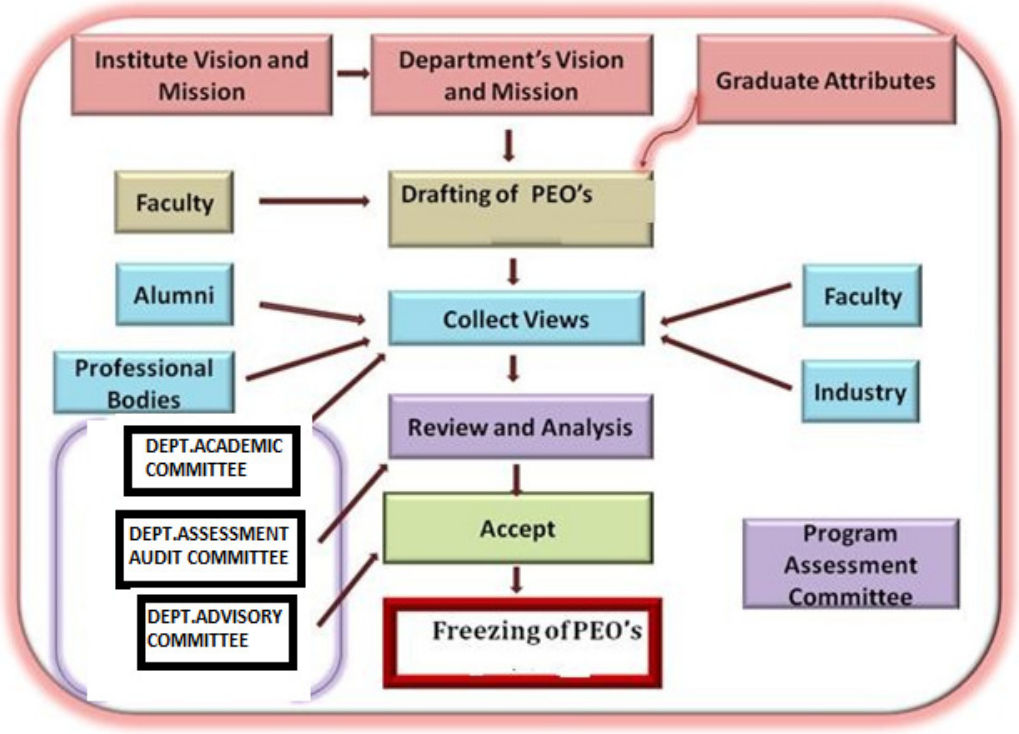

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Figure 3.1: Process to Define PEO's of the Department

PROGRAM OUTCOMES (POs):

PO1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and Engineering sciences.
PO3	Design / development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex Problem	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the Information to provide valid conclusions.
PO5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
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.
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.
PO8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
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.

The POs are published and disseminated:

The Program Outcomes are published and disseminated as follows

How Published	Where Published	How Disseminated
Incorporating in booklet given in orientation, syllabus book, course files and lab manuals	• Orientation booklet • Syllabus books • Course files and lab manuals • Laboratories in the departments	• Distribution and explanation to students on orientation day • Discussed during Orientation Day • Discussed during student Counseling • Distributed along with • Syllabus books, course files and lab manuals
Flexi/ Banner	• Classrooms/Laboratories • Office of the department • Department Notice boards • Staff Rooms	• Self-reading by students, parents and alumni
Digital Media	• Institute Website: www.sreyas.ac.in	• Available for Self-reading in public domain

Table 3.1: PO publishing and dissemination

The Process for Establishing the PSOs:

The PSOs are established through the following process steps:

The Vision, Mission PEOs of the Department along with the 12 Graduate Attributes given by the NBA are 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.

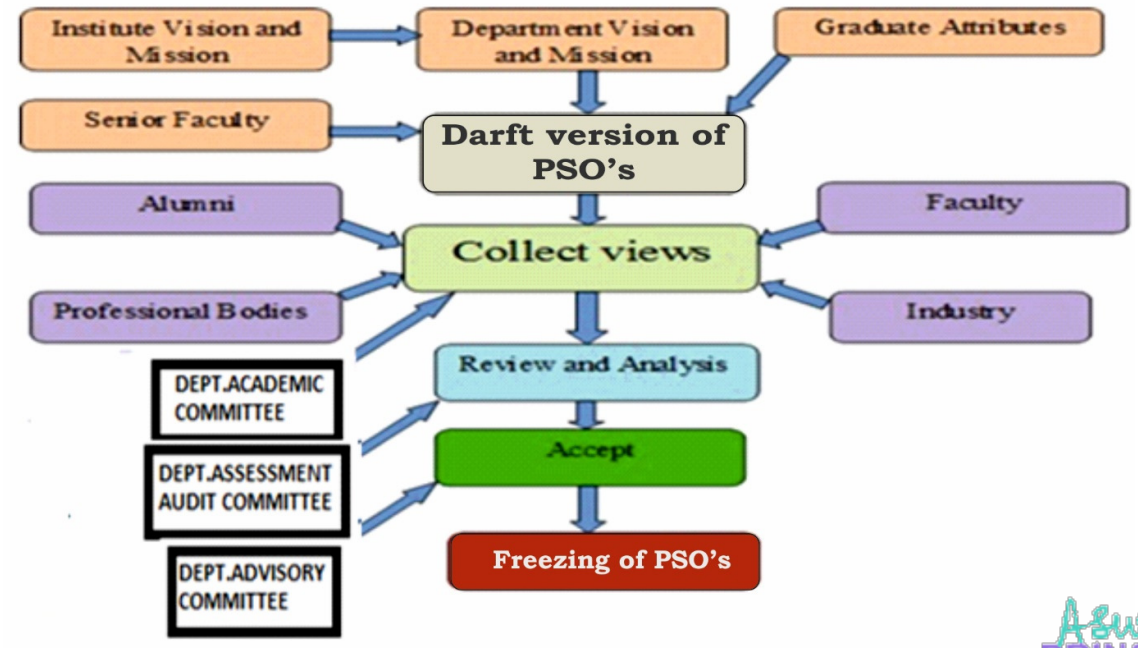


Figure 3.2: Process to Define PSO's of the Department

PROGRAM SPECIFIC OUTCOMES(PSOs):

Department of Electronics and Communication Engineering:

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.

Department of Mechanical Engineering:

PSO1: Good skills on CNC, CAD & CAE for precision systems design and development.

PSO2: Knowledge and skills of designing and manufacturing various mechanical systems.

Department of Computer Science and Engineering:

PSO1: 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.

PSO2: The ability to employee modern computer programming languages, tools and platform to address technological challenges in multi-disciplinary areas of engineering.

Department of Civil Engineering:

PSO1: The graduates will plan, produce detailed drawings, write specification, and prepare cost estimates.

PSO2: The Graduates will excel in the core areas of civil engineering such as structural, Geotechnical, environmental and transportation engineering.

PSO3: The graduates will interact with stakeholders effectively and execute quality construction work applying necessary tools.

3. 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
Remembering: Recall or retrieve previous learned information.	defines, describes, identifies, knows, labels, lists, matches, names, outlines, recalls, recognizes, reproduces, selects, states.	Recite a policy. Quoteprices from memory to a customer. Recite the safety rules.
Understanding: 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.
Applying: Use a concept in a new situation or unprompted use of an abstraction. Applies what was learned in the classroom into novel situations in the workplace.	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.
Analyzing: Separates material or	analyzes, breaks down, compares, contrasts,	Troubleshoot a piece of equipment by using logical

concepts into component parts so that its organizational structure may be understood. Distinguishes between facts and inferences.	diagrams, deconstructs, d differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, relates, selects, separates	deduction. Recognize logical fallacies in reasoning. Gathers information from a department and selects the required tasks for training.
Evaluating: Make judgments about the value of ideas or materials.	appraises, compares, concludes, contrasts, criticizes, critiques, defends, describes, discriminates, evaluates, explains, interprets, justifies, relates, summarizes, supports	Select the most effective solution. Hire the most qualified candidate. Explain and justify a new budget.
Creating: Builds a structure or pattern from diverse elements. Put parts together to form a whole, with emphasis on creating a new meaning or structure.	categorizes, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes	Write a company operations or process manual. Design a machine to perform a specific task. Integrates training from several sources to solve a problem. Revises and process to improve the outcome.

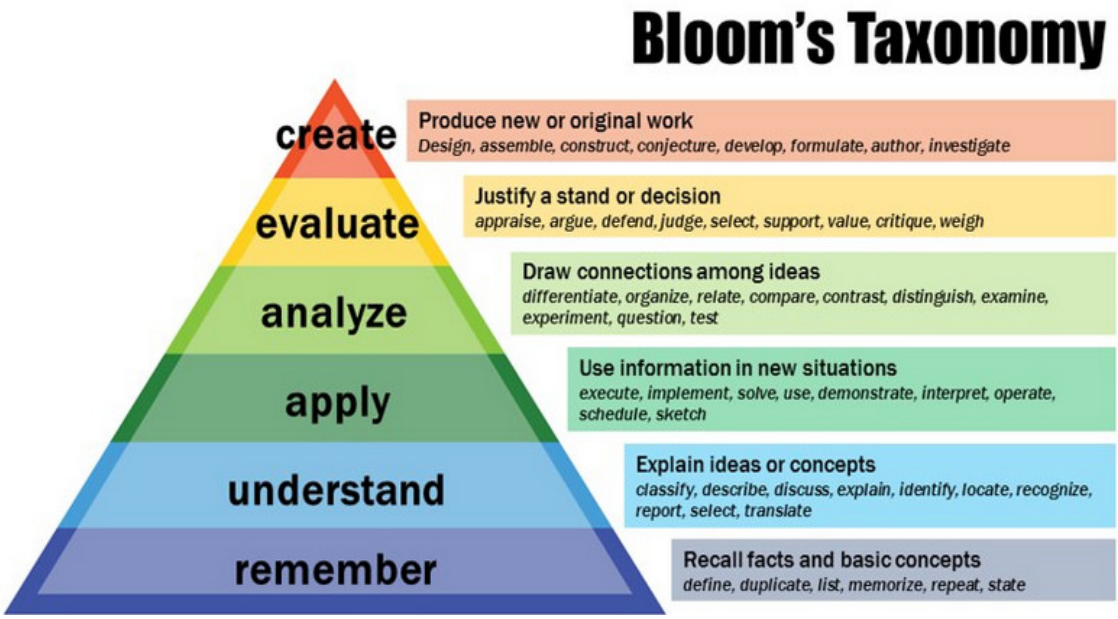


Figure 4.1: Blooms taxonomy levels

4. 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.

5. CO – PO AND CO – PSO MAPPING OFCOURSES

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 grandaunts 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 grandaunts to achieve.

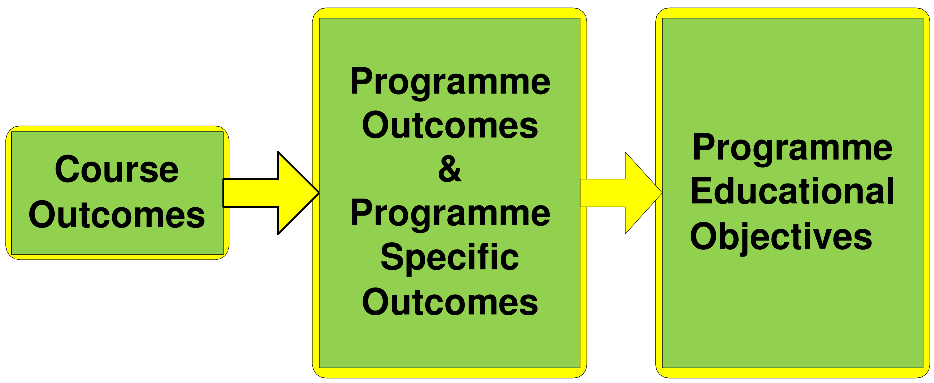


Figure 6.1: Relating the outcomes (CO-PO&PSO-PEO)

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 6.2.

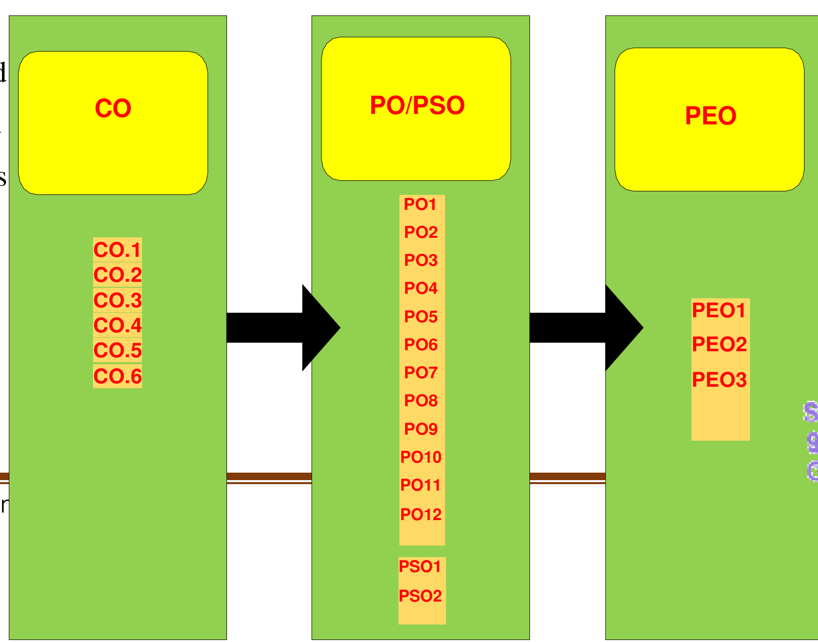


Figure 6.2: Relationship between CO, PO &PSO and PEO

Process involved in CO-PO Mapping:

The role of CO-PO mapping will be assigned to the faculty as per hierarchy followed in figure 6.3. 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.

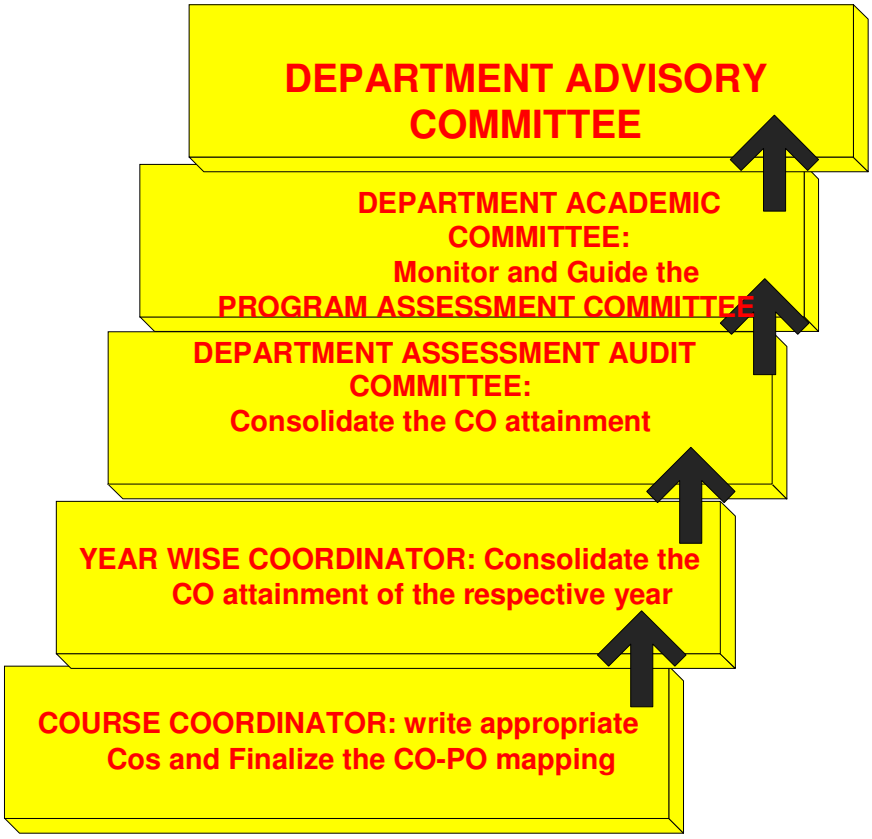


Figure 6.3: Hierarchy of faculty involvement

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 students 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-PSOMAPPING:

Course: **SIGNALS & STOCHASTIC PROCESS**

Course Code: **EC304ES**

Mapping of CO with PO

First two numeric digit 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.

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

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
Average CO(SSP)	2	1

Table 6.2: Sample CO-PSO Matrix

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 6.3 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.

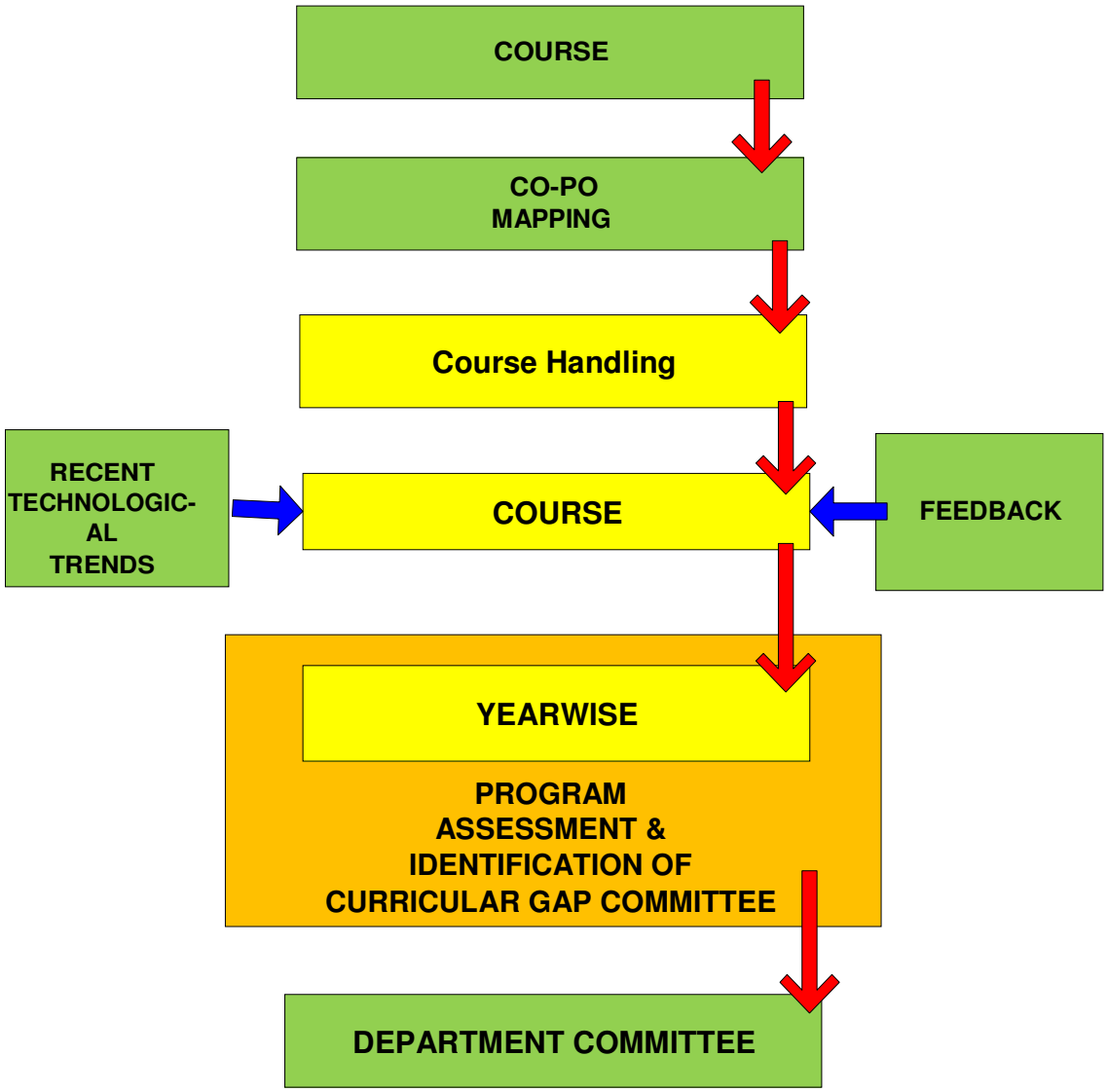


Figure 6.4: Identification of curricular gap

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.

6. 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 6.1. Program level CO-PO matrix

APPING OF COURSE WITH PO"s and PSO"s FOR

BATCH: 2014-2018

YEAR / SEM	Course Code	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
II YEAR II SEMESTER	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

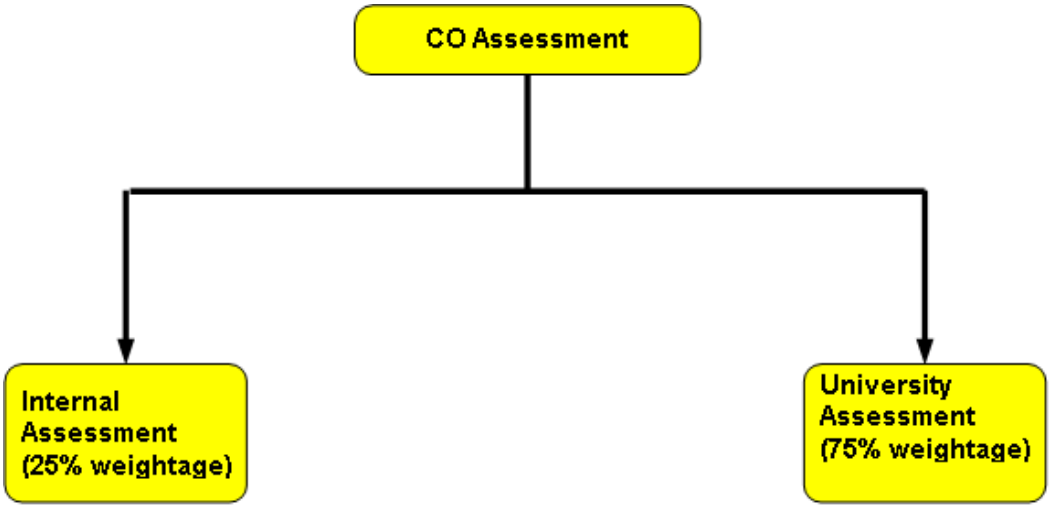
	A50488	2	2	1			3							1	1.4
III YEAR II SEMESTER	A60010		1.8	1.5		1.6							2.8		
	A60110	1		2		1	1.5		2	1			2		
	A60420	2	1.5	2.2	2.5									2	3
	A60432	1.75	2	2.2	2.6	3								2.5	2.75
	A60430	2.4	2	1	3	2	2						2.25	2.5	2
	A60421	3	1.8	1.6	1.25									2	
	A60494	1.6	1	1		1		1		1		1	1	1.2	
	A60493	3	1.67	1		1.67				1			1		2
IV YEAR ISEMESTER	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
IV YEAR II SEMESTER	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
AVERAGE		**2.16**	**2.1**	**1.91**	**1.86**	**1.8**	**1.69**	**1.17**	**1.43**	**1.6**	**2.58**	**1.64**	**1.62**	**1.99**	**1.95**

7. ASSESSMENT PROCESS

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)
>=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 COs 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)
>=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.

Final Value (V) = 25% of Internal Level (I) + 75% 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)
>=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 consist 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 PO's.

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. Practical semester examination focuses on conduction of experiments and viva-voce.
5	Practical Semester Examination	
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.

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	At the end of 8th and 116th weeks of each	Student's performance in internal Assessment

	Test	semester.	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 8thsemester	Rubrics
6	Mini project	At the end of the6th semester	Student's performance in university exams
7	Project	During the 8th semester	Rubrics
8	Project Work Viva voce	At the end of the8th semester	Student's performance in university exams
9	Course Exit Survey	Semester end	Student 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	Student survey
6	Feedback on facilities	Twice in a year	Student 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
University Assessment	Level 1	40-50% of students scoring more than 40% 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:

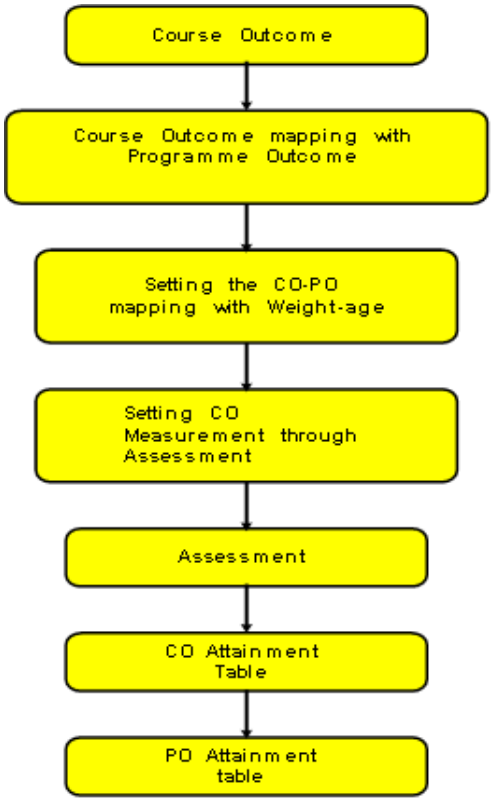


Figure 8.1: The process of CO-PO mapping validation

The process of CO-PO mapping validation is given in figure 8.1 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 direct 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 access 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	A1		2		3	8	5
2	A2	3		2		7	5
3	A3		1		4	5	5
4	A4		4	4		6	5
5	A5	2			5	7	5
6	A6			3		4	5
7	A7		5		2	7	5
8	A8	4			4	9	5
9	A9			3	1	3	5
10	A10	1	3			4	5
11	A11	5			2	6	5
12	A12		2	5		5	5
13	A13			2	5	6	5
No. of students attempted		5	6	6	8	13	13
No. of students scoring >= internal threshold		3	3	4	5	8	13
% of students scoring >= 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).

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

= (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	A1	3		5		7	5	-1
2	A2		1		4	5	5	29
3	A3	1	4		3	6	4	28
4	A4	2			3	4	5	40
5	A5		5	5	4	8	5	56
6	A6			3		5	4	27
7	A7	4			2	4	5	36
8	A8		4	1	5	7	5	40
9	A9	5		2	1	6	5	42
10	A10		3			4	5	22
11	A11	5		2		6	5	30
12	A12		2	2		4	4	29
13	A13	2			4	5	5	-1
No. of students attempted		7	6	7	8	13	13	11
No. of students scoring >= threshold		3	4	2	6	7	13	6
% of students scoring >= 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 >= threshold is 60% and in question 2, % of students scoring >= threshold is 50%. Therefore, CO1 % of students scoring >= threshold is the average of the above i.e. 55%.
- For Objective and assignment part, % of students scoring >= 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.

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 >= threshold for external as same for all COs.

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

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.

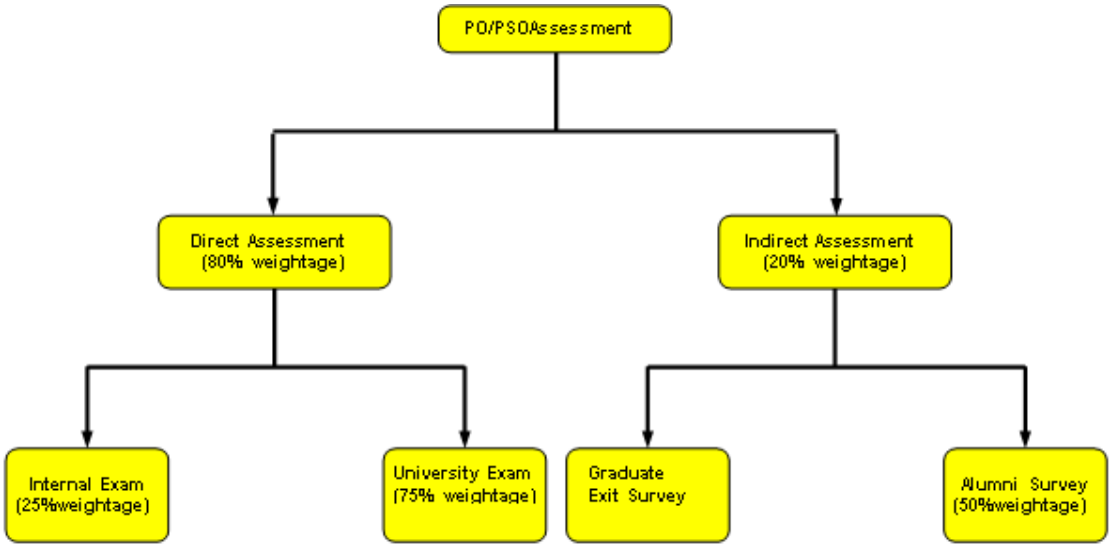
- 80% and 20% are considered for direct and indirect for CO attainment.

CO1 Attainment = (2.15*0.8) + (2.36*0.2) = 2.19

COs	DES	OBJ	ASN	DES	OBJ	ASN	INT	EXT	DIRECT	INDIRECT	CO_Attn
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

8. 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.

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

Table 9.1 Assessment tools used for evaluation of PO and PSO attainment

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9-39, Sy.No: 107, Tattiannaram (V),
Ghatkesar, Bandlaguda, Nagole, Hyd-68.

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. 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 INSTITUTE OF ENGINEERING AND TECHNOLOGY 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

A Suresh
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GSI, Pandlaguda, Nagole, Hyd-68.

(ii) 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

(ii) 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_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_9	I_{10}	I_{11}	I_{12}

Indirect Attainment Ii= 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_1	D_2	D_3	D_4	D_5	D_6	D_7	D_8	D_9	D_{10}	D_{11}	D_{12}
Indirect Attainment	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_9	I_{10}	I_{11}	I_{12}
Overall Attainment	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8	O_9	O_{10}	O_{11}	O_{12}

Overall PO and PSO Attainment

Overall Attainment of POi ; Oi = 80% of Di + 20% of Ii

where Di – Direct Attainment of each PO Ii – 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 PSOi;Oi = 80% of Di + 20% of Ii

where Di – Direct Attainment of each PSOIi – Indirect Attainment of eachPSO

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
	MENAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	A60010
	MICROPROCESSOR AND MICROCONTROLLER	A60494
	MICROPROCESSOR AND CONTROLLER LAB	A70086
	VLSI DESIGN	A60422

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

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Hyderabad | PIN: 500068

ALUMNI SURVEY

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

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	

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Hyderabad | PIN: 500068

Career Information

Placement:

Company	
Designation	
Package	

Higher Education

University	
Degree	
Admission No	

Entrepreneur

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

Signature

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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	

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	

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	

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Evaluation of Attainment of Programme outcomes and Course Outcomes

Establish the correlation between the courses and the Program Outcomes (POs) and Program Specific Outcomes (PSOs)

(A) PROGRAM OUTCOMES

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and Engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the Information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

(B) PROGRAM SPECIFIC OUTCOMES (PSOs)

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

Course Outcomes (COs) (SAR should include course outcomes of one course from each semester of study, however, should be prepared for all courses and made available as evidence, if asked)

Note: Number of Outcomes for a Course is expected to be around 6.

Table 2.6.2.1: Course outcomes of Signals & Stochastic Process for II year I sem

EC304ES	Signals & Stochastic Process: Upon successful completion of this course, students should be able to:	B.T Level
C204.1	Represent any arbitrary analog or digital time domain signal	2
C 204.2	Analyze Fourier series and Fourier transform for standard signals, sampling of band limited signals.	3
C 204.3	Apply the LT and ILT to find the ROC for different types of signals.	4
C 204.4	Apply the ZT and IZT for discrete time signals and to find the ROC of ZT, of different types of signals	4
C 204.5	Describe and interpret the basic concepts of Probability and Stochastic Process.	2
C 204.6	Learn spectral characteristics of random process.	2

Table 2.6.2.2: Course outcomes of Analog Communications for II year II sem

EC405ES	Analog Communications : Upon successful completion of this course, students should be able to	B.T Level
C214.1	Distinguish the baseband signal, band pass signals in electronic communication systems and Understand the Need for Frequency Translation.	2
C214.2	Analyze and design various modulation and demodulation analog systems.	4
C214.3	Perform the mathematical analysis associate with Angle Modulations (FM& PM)	4
C214.4	Understand the generation, detection of Various analog modulation techniques	2
C214.5	Analyze signal to noise ratio (SNR) performance of various Analog communication system.	4
C214.6	Distinguish the concepts of Multiplexing: Time Division Multiplexing (TDM) and Frequency Division Multiplexing (FDM).	2

Table 2.6.2.3: Course outcomes of Linear and Digital IC Applications for III year I sem

A50425	Linear and Digital IC Applications : Upon successful completion of this course, students should be able to:	B.T Level
C306.1	Construct modules for Linear and Non-Linear applications using IC's.	1
C 306.2	Design of waveform generators and active filters using IC's for different bandwidths.	2
C 306.3	Analyze the functioning of Analog to Digital Converters using IC's.	3
C 306.4	Analyze the functioning of Digital to Analog Converters using IC's.	3
C 306.5	Design of combinational logic circuits using IC's.	4
C 306.6	Develop sequential logic circuits and memories using IC's.	4

Table 2.6.2.4: Course outcomes of Digital Signal Processing for III year II sem

A60421	Digital Signal Processing: Upon successful completion of this course, students should be able to:	B.T Level
C316.1	Apply the principles of Z-transforms to finite difference equations for stability analysis	3
C316.2	Compute the discrete time domain & frequency domain of signals using DFS , DFT , FFT	3
C316.3	Analyze various analog filter approximations and compare Chebyshev and Butterworth filters	4
C316.4	Design of IIR digital filters using Impulse Invariant & Bilinear	4

	transformation techniques	
C316.5	Design FIR digital filters using Fourier series, window method	4
C316.6	Understand the trade-off between normal and multi-rate DSP techniques, finite word length effects and round-off errors	2

Table 2.6.2.5: Course outcomes of Embedded System Design for IV year I sem

A70440	Embedded System Design : Upon successful completion of this course, students should be able to:	B.T Level
C406.1	Analyze the quality attributes of the Embedded Systems	4
C 406.2	Design embedded system with customized processors, Commercial Off-The-Shelf Components (COTS) and memory.	4
C 406.3	Efficiently utilise other system components such as Reset circuit, Brownout protection circuit, Real Time Clock, Watch Dogtimer in building embedded system	3
C 406.4	Develop Embedded Firmware using various design approaches and development languages	4
C 406.5	Classify various types of operating systems used for Embedded Systems	4
C 406.6	Analyze the importance of task communication, task synchronization in operating systems.	4

Table 2.6.2.6:Course outcomes of Radar Systems for IV year II sem

A80450	Radar Systems : Upon successful completion of this course, students should be able to:	B.T Level
C412.1	Analyze the radar range equation.	4
C412.2	Apply the knowledge of Doppler effect to analyze the characteristics of CW and FM-CW radars.	4
C412.3	Understand the characteristics of MTI Radar	2
C412.4	Analyze the behaviour of Pulse Doppler Radars.	4
C412.5	Distinguish different tracking methods and range measurements in radars.	2
C412.6	Apply radar range equation to understand beam steering methods in the phased array radar.	3

CO-PO matrices of courses selected above Subjects (six matrices to be mentioned; one per semester from 3rd to 8th semester)
Note:

1. Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
It there is no correlation, put "-"

1. Similar table is to be prepared for PSOs

Table 2.6.2.7 :CO-PO mapping of Signals & Stochastic Process II year I sem

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C204.1	3	3	1	1								
C 204.2	3	3	1	2								
C 204.3	3	2	1	1								
C 204.4	3	2	1	2								
C 204.5	3	3	1	2								
C 204.6	3	3	1	1								
Average	3.00	2.67	1.00	1.50								

Table 2.6.2.8:CO-PO mapping of Analog CommunicationsII year II sem

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C214.1	3	3			3							
C214.2	3	3			3							
C214.3	3	3	1		3							
C214.4	3	3	1		2							
C214.5	2	2	1		2							
C214.6	2	2			2							
Average	2.67	2.67	1.00		2.50							

Table 2.6.2.9:CO-PO mapping of Linear and Digital IC Applications III year I sem

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C306.1		2	3									
C 306.2	1	3	3	2								
C 306.3		2	2	1								
C 306.4		2	2	1								
C 306.5		2	3	2								
C 306.6		3	2	3								
Average	1.00	2.33	2.50	1.80								

Table 2.6.2.10:CO-PO mapping of Digital Signal Processing III year II sem

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C316.1	3	2	1	1								
C316.2	3	2	1	1								
C316.3	3	2	1									
C316.4	3	2	1	1								
C316.5	3	1	2	1								
C316.6		2	3	2								

Average	3.00	1.83	1.50	1.20								

Table 2.6.2.11:CO-PO mapping of Embedded System Design IV year I sem

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C406.1	2	2	1	1	1	1	1					
C 406.2	2	3	1		1	1	1	1	1			
C 406.3	2	3	1	1								
C 406.4	2	2	1		2	1	1		1			1
C 406.5	2	2					2					
C 406.6	2	2		1	1	1	1					1
Average	2.00	2.33	1.00	1.00	1.25	1.00	1.20	1.00	1.00			1.00

Table 2.6.2.12:CO-PO mapping of Radar Systems IV year II sem

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C412.1	3	3	3	3	3							1
C412.2	3	3	1	3	3							1
C412.3	3	3	2	3	3							2
C412.4	3	3	2	3	3							2
C412.5	3	3	3	3	3							1
C412.6	3	3	3	3	3							1
Average	3.00	3.00	2.33	3.00	3.00							1.33

Table 2.6.2.13: COs - PSOs of Signals & Stochastic Proces II year I sem

CO	PSO1	PSO2
C204.1	2	1
C 204.2	2	1
C 204.3	2	1
C 204.4	2	1
C 204.5	2	1
C 204.6	2	1
Average	2	1

Table 2.6.2.14: COs - PSOs ofAnalog Communications II year II sem

CO	PSO1	PSO2
C214.1	3	1
C214.2	3	1
C214.3	3	1
C214.4	3	1
C214.5	3	1

C214.6	3	1
Average	3	1

Table 2.6.2.15: COs - PSOs of Linear and Digital IC Applications III year I sem

CO	PSO1	PSO2
C306.1	2	
C 306.2	2	1
C 306.3	3	3
C 306.4	3	3
C 306.5	1	1
C 306.6	1	2
Average	2	2

Table 2.6.2.16: COs - PSOs of Digital Signal Processing III year II semSixth Semester

CO	PSO1	PSO2
C315.1	3	
C315.2	2	
C315.3	2	
C315.4	2	
C315.5	2	
C315.6	1	
Average	2	

Table 2.6.2.17: COs - PSOs of Embedded System Design IV year I sem

CO	PSO1	PSO2
C406.1	1	
C 406.2	2	
C 406.3	2	
C 406.4		
C 406.5		
C 406.6		
Average	1.67	

Table 2.6.2.18: COs - PSOs of Radar Systems IV year II sem

CO	PSO1	PSO2
C412.1	1	
C412.2	1	
C412.3	1	
C412.4	1	
C412.5	1	
C412.6	1	
Average	1	

Program level Course-PO matrix of all courses INCLUDING first year courses

Note: 1. Enter correlation levels 1, 2 or 3 as defined 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High), It there is no correlation, put " "

Table 2.6.2.19: Program outcome matrix for 2014-18

Course code/ Course title		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
I year													
C101	A10001									1.00	2.50		
C102	A10002	3.00	1.67	1.00	1.00	1.00							
C103	A10003	3.00	2.00	1.00	1.75	1.00							
C104	A10004	2.83	1.17	1.00	1.00	1.00							
C105	A10005	1.33	1.00	1.00		1.00							
C106	A10501	2.00	2.33	1.00	1.00	1.20							1.00
C107	A10301	2.00			1.00	1.50							
C108	A10581	2.67	2.33	1.00	1.00	1.25							
C109	A10081	1.50	1.25	1.00	1.00	1.25							
C110	A10083									1.00	2.17		
C111	A10082	2.00	2.00	1.00	2.00		3.00						
II year I semester													

C201	A30007	2.2	3	3	2								
C202	A30405	3	3	2	1.2								
C203	A30407	2.4	2.4	2.6	2.6								1
C204	A30204	1.5	1.5	2	1								1
C205	A30404	1.2	2	2.5	1.67								
C206	A30406	2.6	3	2.4	2.2	1.6							
C207	A30482	2.25	2										
C208	A30481	3	3	2.2	2	2							
II year II semester													
C211	A40215	1.8	2.40	2.2	1.4	1.33							
C212	A40412	1.67	2.33	2.67	3	2							
C213	A40415	1	1.33	2.67	2.32								
C214	A40009					1	1.5	1.6	1			1	1
C215	A40411	3	3	3	2.6	3							
C216	A40410	1.6	2	2	1	1.2							
C217	A40288	1.8	2	2	1.4	1							
C218	A40484	1.2	2.6	2.4	3	3							
III year I semester													
C301	A502	2.0	1			3							

	17												
C302	A50516	2.67	2.0	2.0		1							
C303	A50418	2.2	1.8	2.3	1								
C304	A50422	1.2	1.3		2								
C305	A50408	3.0	2.67	1.33	3	2.33	2.33						
C306	A50425	1.0	1.2	1.5	2								1
C307	A50487	2	2	1			3						
C308	A50488	1	2.4	2.6	2								
III year II semester													
C311	A60010	2	1.5	2.2	2.5								
C312	A60117	1		2		1	1.5		2	1			2
C313	A60420	3	1.67	1		1.67				1			1
C314	A60432	3	1.8	1.6	1.25								
C315	A60430		1.8	1.5		1.6							2.8
C316	A60421	1.6	1	1		1		1		1		1	1
C317	A60494	2.4	2	1	3	2	2						2.25
C318	A60493	1.75	2	2.2	2.6	3							
IV year I semester													
C401	A70014				2	1	1	1	1	1		1	2

C402	A70442	2	2	2	2								
C403	A70515	3	3	3	2	1	1	1					1
C404	A70434	3	3	2	1								2
C405	A70436	2	2	3	2	1			1			1	1
C406	A70440	3	3	1		1							2
C407	A70086	2	2	3	2	3							
C408	A70499	3	2	2	1		1	1				1	
IV year II semester													
C411	A80452	3	3	1	1		2	2				1	
C412	A80450	3	2		1								
C413	A80437	3	3	2	1	1		1					
C414	A80087	1.54	1.49	2.64	3	3	1	1	1	3	3	2	1
C415	A80089	3	3	3	3	3	3	1		1	3	3	3
C416	A80088	1.54	1.49	2.64	3	3	1	1	1	3	3	2	1
C417	A80090	3	2	1	2	3	1				3	2	3
Average		2.20	2.09	1.90	1.83	1.72	1.74	1.16	1.17	1.44	2.78	1.50	1.58

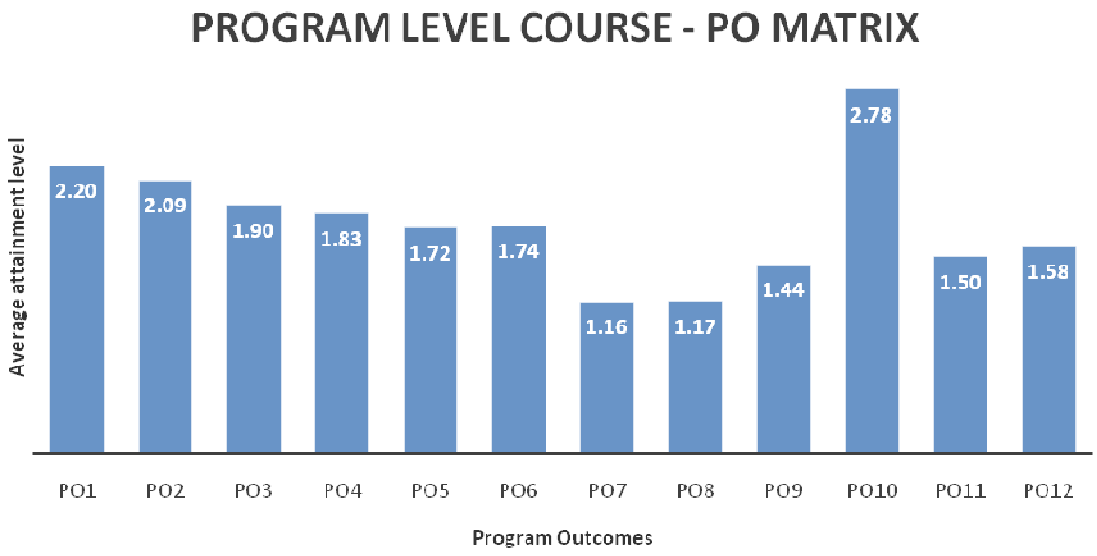


Fig 2.6.2.1 Average attainment of POs in academic year

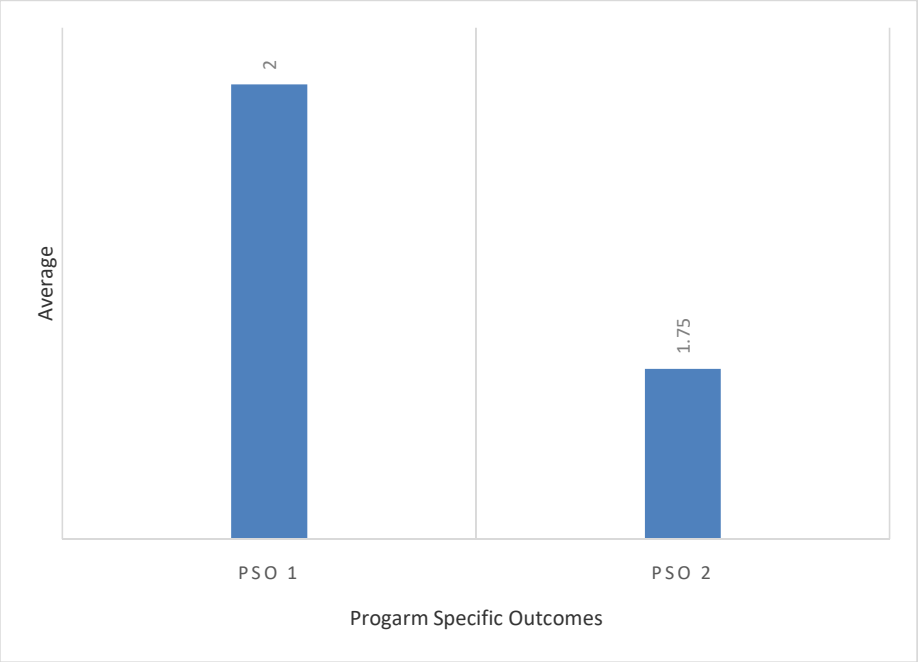
Above graph for the academic year 2014-18 shows that two PO's average attainment level reached 70%, Five PO's average attainment level reached above 60% and remaining levels reached above 50%.

Table 2.6.2.20: Program level Course-PSO matrix of all courses INCLUDING first year courses

Course code	University code	PSO1	PSO2
I year			
C101	A10001		
C102	A10002		
C103	A10003		
C104	A10004		
C105	A10005		
C106	A10501		
C107	A10301		
C108	A10581		
C109	A10081		
C110	A10083		
C111	A10082		
II year I semester			
C201	A30007		
C202	A30405	2	1
C203	A30407	3	2
C204	A30204	2	
C205	A30404	2	2.67
C206	A30406	1	1.4
C207	A30482	2	1.5
C208	A30481	1	3
II year II semester			
C211	A40215	1.33	
C212	A40412	2.33	2.33

C213	A40415	1.67	1.32
C214	A40009		
C215	A40411	1.2	1.2
C216	A40410		1
C217	A40288	1	
C218	A40484	2.8	
III year I semester			
C301	A50217	2	1
C302	A50516	1.0	1.0
C303	A50418	1.8	1.0
C304	A50422	1.0	1.3
C305	A50408	1.3	
C306	A50425	2.5	
C307	A50487	1.0	1.3
C308	A50488	1.8	1.75
III year II semester			
C311	A60010	2	3
C312	A60117		
C313	A60420		2
C314	A60432	2	
C315	A60430		
C316	A60421	1.2	
C317	A60494	2.5	2
C318	A60493	2.5	2.75

IV year I semester			
C401	A70014		
C402	A70442	2	2
C403	A70515	3	3
C404	A70434	2	0
C405	A70436	2	0
C406	A70440	2	2
C407	A70086		
C408	A70499	1	2
IV year II semester			
C411	A80452	3	1
C412	A80450	2	0
C413	A80437	3	2
C414	A80087	3	3
C415	A80089	3	3
C416	A80088	3	2.33
C417	A80090	3	3
Average		2.00	1.75



Above graph for the academic year 2014-18 shows that PSO average attainment level reached 60%.

Attainment of Course Outcomes

Component	Components of Evaluation	Nature of exam
Theory	MCQ's	Multiple choice questions
	First Mid exam	Short essay and long essay questions
	MCQ's	Multiple choice questions
	End Mid exam	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	

Describe the assessment processes used to gather the data upon which the evaluation of Course Outcome is based

(Examples of data collection processes may include, but are not limited to, specific exam/tutorial questions, assignments, laboratory tests, project evaluation, student portfolios (A portfolio is a collection of artifacts that demonstrate skills, personal characteristics, and accomplishments created by the student during study period), internally developed assessment exams, project presentations, oral exams, focus groups etc. It is expected that each theory subject taught should impart specific knowledge and make a foundation for a set of Basic Concepts related to it. Similarly, the laboratory experiments should have some predetermined and predefined skills which can be developed during the study)

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.

(i) 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)
>=80%	3
60% - 79%	2
40% - 59%	1

(ii) 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 COs 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)
>60%	3
40% - 60%	2
35% - 39%	1

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

Final Value (V) = 25% of Internal Level (I) + 75% of External Level (E)

Example: B. Tech III Semester (**II year /I Semester)** course (subject) – **Signal & Stochastic Process (A30406)** in **2017-18**year.

The following are the marks of theory internal.

Table 2.6.2.21: Sample calculation of internal exam attainment

SSP	First class with Distinction (>80%) Attainment level is 3	First class (60 to80 %) Attainment level is 2	Pass class (<60%) Attainment level is 1	Total students
No of students	34	121	25	218
No of students X value	34*3=102	121*2=242	25*1=25	
Total	102+242+25=369			
Ratio	369/218=1.69			
Value 25% for internal exams	1.69*.25=0.4225			

Table 2.6.2.22: Sample calculation of external exam attainment

SSP	First class with Distinction (>60%) Attainment level is 3	First class (40 to60%) Attainment level is 2	Pass class (<40%) Attainment level is 1	Total students
No of students	56	83	33	218
No of students X value	56*3=168	83*2=166	33*1=33	
Total	168+166+33=367			
Ratio	367/218=1.68			
Value 75% for external exams	1.68*0.75=1.26			

The university theory examinations are conducted in another college. In other words, students of college do not write their theory examination in their parent college

Theoretical attainment = 2.20

% of Direct attainment of outcomes = 25% Internal Exams +75% of External Exams

= 0.4225+1.26 =1.6825

On 3 scale = (Achieved / target)*3

= 2.29

Electronic devices & Circuits Lab is considered. The calculation is as follows.

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)

>60%	3
40% - 60%	2
35% - 39%	1

Internal Practical Course

Table 2.6.2.23: Sample calculation of internal practical course attainment

EDC Lab	First class with Distinction (>80%) Attainment level is 3	First class (60 to80 %) Attainment level is 2	Pass class (<60%) Attainment level is 1	Total students
No of students	160	55	1	218
No of students X value	160*3=480	55*2=110	1*1=1	
Total	480+110+1=591			
Ratio	591/218=2.71			
Value 20% for internal exams	2.71*0.25=0.6775			

For University practical exams, the University marks are 75% as per JNTUH regulations. However, as per NBA suggestion, only 80% is considered for the calculation.
The calculation is as follows.

University Practical Course

Table 2.6.2.24: Sample calculation of University practical course attainment

EDC Lab	First class with Distinction (>80%) Attainment level is 3	First class (60 to 80%) Attainment level is 2	Pass class (<60%) Attainment level is 1	Total students
No of students	162	32	22	218
No of students	162*3=486	32*2=64	22*1=22	

X value				
Total	486+64+22=572			
Ratio	572/218=2.62			
Value 80% for internal exams	2.62*0.8=2.09			

For conducting practical examination of University, external examiner is appointed by the JNTUH.
The above calculated values are tabulated as follows

Table 2.6.2.25:Overall attainment

EDC Lab	**University**		**Internal**		**Total**
	100	**80**	**100**	**20**	
	2.62*0.8=2.09	1.67	2.71*0.2=0.54	0.108	1.778
Theoretical attainment = 2.1 **% attainment of outcomes = 1.778/2.1=84% (2.54 on 3 scale)**					

Similar calculations are made for all courses for the previous programs (2012-16,2013-17 and 2014-18).

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.

Table 2.6.2.26: Rubrics for Seminar evaluation

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:

- 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.

Record the attainment of Course Outcomes of all courses with respect to set attainment Levels

Program shall have set Course Outcome attainment levels for all courses. (The attainment levels shall be set considering average performance levels in the university examination of

any higher value set as target for the assessment years. Attainment level is to be measured in terms of student performance in internal assessments with respect the course outcomes of a course in addition to the performance in the University examination)

Table 2.6.2.27 Attainment of Course Outcomes of all courses with respect to set attainment Levels

Course code	University code	University attainment		Internal attainment		Attainment level		% Attainment (Achieved / required) X 100	Attainment In scale 3
		100%	75% (100 X0.75)	100%	25% (100X.25)	Achieved	Required		
C101	A10001	3.00	2.25	1.80	0.45	2.70	2.7	100	3
C102	A10002	1	0.75	1.32	0.33	1.08	2	54	1.62
C103	A10003	1.00	0.75	1.64	0.41	1.16	2	58	1.74
C104	A10004	2	1.5	1.40	0.35	1.85	2	92	2.7
C105	A10005	2	1.5	1.32	0.33	1.83	2	91.5	2.74
C106	A10501	1	0.75	0.96	0.24	0.99	2	49.5	1.485
C107	A10301	1.00	0.75	1.20	0.30	1.05	2	52.5	1.575
C108	A10581	1.00	0.66	2.80	0.95	1.61	2	80.5	2.415
C109	A10081	2	1.22	1.80	0.61	1.83	2	91.5	2.745

C110	A10083	2	1.5	1.80	0.45	1.95	2	97.5	2.925
C111	A10082	3.00	2.25	1.80	0.45	2.70	3	90	2.7
C201	A30007	2	1.5	1.00	0.25	1.75	2	87.5	2.63
C202	A30405	2	1.5	1.39	0.35	1.85	2	92.5	2.78
C203	A30407	2	1.5	1.31	0.33	1.83	2.5	73.2	2.20
C204	A30204	1	0.75	1.21	0.30	1.05	2	52.5	1.58
C205	A30404	2	1.5	1	0.25	1.75	2	87.5	2.63
C206	A30406	1	0.75	1	0.25	1	2	50	1.50
C207	A30482	2	1.32	2	0.68	2.00	2	100	3.00
C208	A30481	1	0.66	1.40	0.48	1.14	2	57	1.71
C211	A40215	2	1.5	1.12	0.28	1.78	2.5	71.2	2.14
C212	A40412	2	1.5	1.31	0.33	1.83	2	91.5	2.75
C213	A40415	1	0.75	1.29	0.32	1.07	2	53.5	1.61
C214	A40009	3	2.25	1.80	0.45	2.70	3	90	2.70
C215	A40411	1	0.75	1.08	0.27	1.02	2	51	1.53
C216	A40410	2	1.50	1.31	0.33	1.83	2.5	73.2	2.20
C217	A40288	1	0.66	1.60	0.54	1.20	2.5	48	1.44
C218	A40484	1	0.66	1.60	0.54	1.20	2.5	48	1.44
C301	A50217	1	0.75	1.29	0.32	1.07	2	53.50	1.61
C302	A50516	1	0.75	2.14	0.53	1.25	2.5	50.00	1.50
C303	A50418	2	1.50	1.21	0.30	1.80	2	90.00	2.70
C304	A50422	1	0.75	1.42	0.35	1.10	2.5	44.00	1.32
C305	A50408	1	0.75	1.69	0.42	1.14	3	38.00	1.14
C306	A50425	2	1.50	1.29	0.32	1.82	2.5	72.80	2.18
C307	A50487	2	1.32	1.60	0.54	1.86	2.5	74.40	2.23

C308	A50488	1	0.66	1.60	0.54	1.20	2.5	48.00	1.44
C311	A60010	2	1.50	1.67	0.42	1.92	3	64.00	1.92
C312	A60117	2	1.50	1.29	0.32	1.82	3	60.67	1.82
C313	A60420	1	0.75	1.80	0.45	1.20	2.5	48.00	1.44
C314	A60432	2	1.50	1.79	0.42	1.95	2.5	78.00	2.34
C315	A60430	2	1.50	2.17	0.54	2.04	3	68.00	2.04
C316	A60421	1	0.72	1.42	0.35	1.10	2.5	44.00	1.32
C317	A60494	2	1.32	1.60	0.54	1.86	2.5	74.40	2.23
C318	A60493	1	0.66	1.60	0.54	1.20	2.5	48.00	1.44
C401	A70014	3	2.25	2.61	0.65	2.90	3	96.67	2.9
C402	A70442	2	1.5	2.09	0.52	2.02	2.5	80.80	2.424
C403	A70515	0	0	1	0.25	0.25	3	8.33	0.25
C404	A70434	3	2.25	2.56	0.64	2.89	2.5	Achieved	Achieved
C405	A70436	3	2.25	2.8	0.70	2.95	3	98.33	2.95
C406	A70440	2	1.5	2.24	0.56	2.06	3	68.67	2.06
C407	A70086	3	2.25	2.84	0.71	2.96	3	98.67	2.96
C408	A70499	3	2.25	2.84	0.71	2.96	3	98.67	2.96
C411	A80452	1	0.75	1.64	0.41	1.16	2.5	46.40	1.392
C412	A80450	0	0	1.05	0.26	0.26	3	8.67	0.26
C413	A80437	1	0.75	1.64	0.41	1.16	2.5	46.40	1.392

Attainment of Program Outcomes and Program Specific Outcomes

Describe assessment tools and processes used for measuring the attainment of each of the Program Outcomes and Program Specific Outcomes

(Describe the assessment tools and processes used to gather the data upon which the evaluation of each the Program Outcome is based indicating the frequency with which these

processes are carried out. Describe the assessment processes that demonstrate the degree to which the Program Outcomes are attained and *document the attainment levels).
The assessment tools and processes to gather data was mentioned in 3.2.1 and 3.2.2.The course outcomes are mapped for each program outcome. The attainment of course outcomes achieved in the years 2016-17 and 2017-18 are translated into program outcomes based on the COPO Matrixes and course–PO Matrixes.

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

Table 2.6.2.28 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
	MCQ's	Multiple choice questions
	End Mid exam	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

Table 2.6.2.29 :External exam assessment tools

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.

Table 2.6.2.30: Direct assessment tools

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. Practical semester examination focuses on conduction of experiments and viva-voce.
5	**Practical Semester Examination**	
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.

Table 2.6.2.31: indirect assessment tools

S. N.	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

Table 2.6.2.32: 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 8th and 116th 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		Student's performance in conducting experiments during University exams.
5	Seminar	During the 8th semester	Rubrics
6	Mini project	At the end of the 6th semester	Student's performance in university exams
7	Project	During the 8th semester	Rubrics
8	Project Work Viva voce	At the end of the 8th semester	Student's performance in university exams
9	Course Exit Survey	Semester end	Student survey

Table 2.6.2.33: 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	Student survey
6	Feedback on facilities	Twice in a year	Student survey

PO and PSO evaluation

Frequency of carrying out the process: once in year. The POs are obtained from course outcomes, which composed a number of tools, end examination practical's, MCQs, assignments, seminars etc., each one has uniquely suited to achieve PO's. The evaluation is spread throughout the program, examinations, job placements data, faculty survey on students and experimental site perceptions. Higher studies records, GATE scores are a few more tools.

Provide results of evaluation of each PO & PSO

Program shall set Program Outcome attainment levels for all POs & PSOs.
(The attainment levels by direct (student performance) and indirect (surveys) are to be presented through Program level Course – PO & PSO matrix as indicated).

The results evaluation is made in two levels:

1. Student performance (direct) – 80% value
2. Surveys (indirect) – 20% value

Direct attainment level of PO is determined by taking average across all courses.
Indirect attainment level of PO is determined on the student surveys (alumni).

Table 2.6.2.34:Program Outcome attainment levels

Batch 2014-18

Course code	University code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C101	A10001									2.6	2.69		
C102	A10002	1.08	1.08	1.09	1.06	1.1							
C103	A10003	1.16	1.15	1.13	1.18	1.15							
C104	A10004	1.11	1.1	1.08	1.11	1.09							
C105	A10005	1.11	1.08	1.08		1.06							
C106	A10501	1	1	1	1	0.99							0.95
C107	A10301	1.05	1.05	1.05	1.05	1.05							
C108	A10581	1.61	1.61	1.61	1.61	1.61							1.61
C109	A10081	1.27	1.27	1.27	1.27	1.27							
C110	A10083									1.93	1.93		
C111	A10082	1.27	1.27	1.27	1.27	1.27							
C201	A30007	1.05	1.05	1.05	1.05	1.04							
C202	A30405	1.83	1.83	1.83	1.86								
C203	A30407	1.85	1.85	1.85	1.85								1.84
C204	A30204	1.05	1.05	1.04	1.05								1.04
C205	A30404	1.75	1.75	1.75	1.75								
C206	A30406	1	1	1	1	1							

C207	A30482	2	2										
C208	A30481	1.14	1.14	1.14		1.14							
C211	A40215	1.79	1.81	1.81	1.8	1.76							
C212	A40412	1.7	1.7	1.25	1.35	1.5							
C213	A40415	1.1	1.07	1.07	1.06								
C214	A40009					2.72	2.6	2.78	2.78			2.6	2.96
C215	A40411	1.02	1.02	1.02	1.01	1.03							
C216	A40410	1.78	1.77	1.78	1.78	1.77							
C217	A40288	1.2	1.2	1.2	1.2	1.2							
C218	A40484	1.2	1.2	1.2	1.2	1.2							
C301	A50217	1.06	1.06	1.07	1.07	1.06	1.07						
C302	A50516	1.29	1.33		1.36								
C303	A50418	1.81	1.81	1.8	1.81								
C304	A50422	1.11	1.16	1.04	1.03		1.42						1
C305	A50408	1.19	1.18	1.18		1.18							
C306	A50425	1.75	1.82	1.81	1.84								
C307	A50487	1.86	1.86			1.86							
C308	A50488	1.2	1.2	1.2		1.2							
C311	A60010		1.89	1.92		1.92							1.91

C312	A60117	1.85		1.75		1.85	1.88		1.84	1.85			1.82
C313	A60420	1.21	1.19	1.17	1.19								
C314	A60432	1.98	1.96	1.96	1.96	1.9							
C315	A60430	2.04	2.08	2.08	2	2.03	1.93						2.05
C316	A60421	1.09	1.08	1.09	1.08								
C317	A60494	1.86	1.86	1.86		1.86		1.86		1.2		1.2	1.86
C318	A60493	1.2	1.2	1.2		1.2				1.2			1.2
C401	A70014	2.67	2.70	2.62	2.65	2.61	2.61		2.61	2.61	2.60	2.63	2.63
C402	A70442	2.08	2.07	2.15		2.25							2.06
C403	A70515	1.44	1.45	1.45	1.45	1.50	1.47	1.50					1.50
C404	A70434	2.68	2.66	2.67	2.66								
C405	A70436	2.95	2.96	2.95	2.90								2.95
C406	A70440	2.25	2.25	2.25	2.25	2.25			2.25			2.25	2.25
C407	A70086	2.90	2.84		2.84		2.80			2.73	2.84	2.73	2.83
C408	A70499	2.84	2.84	2.84	2.80	2.85	2.80	2.84				2.80	
C411	A80452	1.48	1.48	1.48	1.48	1.48	1.48	1.49				1.49	1.48
C412	A80450	1.40	1.40	1.41	1.40	1.40							1.40
C413	A80437	1.65	1.63	1.63	1.64	1.64		1.62					
C414	A80087	3	3	3	3	3		2				2	3

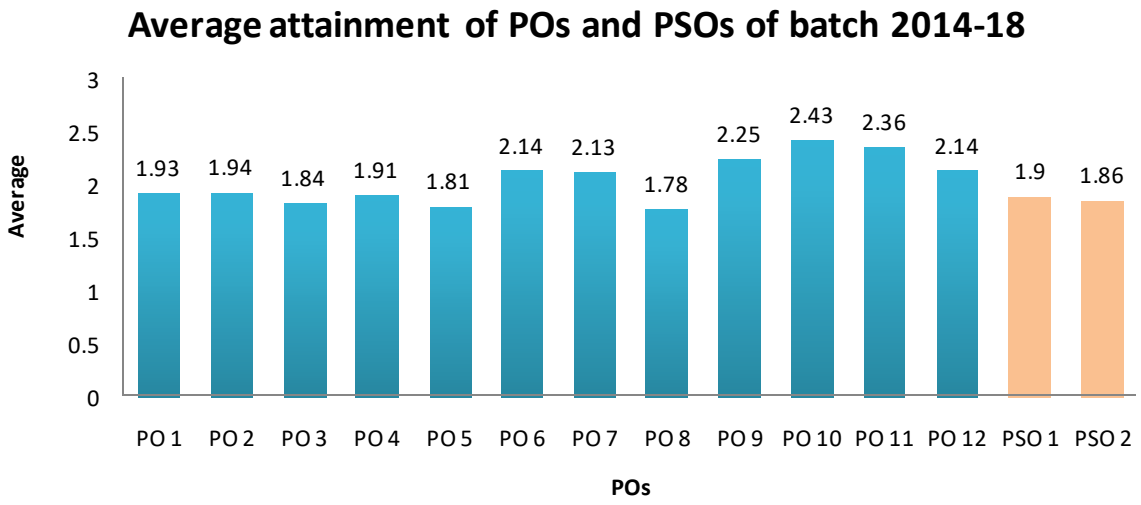
C415	A80089	2.82	2.89	2.76	2.82	2.82	1.82	2	0.06	2.99	2.99	2.99	2.99
C416	A80088	3	3	3	3	3	3	2	1	2	2	2	3
C417	A80090	2.16	2.41	2.13	2.16	2.16	1.18	1.84	0.34	2.27	2.25	2.29	2.63
B. Tech. ECE, Direct attainment (3 Max)		1.67	1.67	1.63	1.68	1.66	2.00	1.99	1.55	2.14	2.47	2.27	2.04
B. Tech. ECE, Direct attainment (100%)		55.52	55.75	54.27	55.98	55.26	66.82	66.43	51.81	71.27	82.38	75.70	68.06
B. Tech. ECE, Direct attainment (80%)		44.41	44.60	43.42	44.79	44.21	53.46	53.15	41.45	57.01	65.90	60.56	54.45
B. Tech. ECE, Indirect attainment (20%)		20	20	18	19	16	18	18	18	18	15	18	17
Total attainment, %		64.41	64.60	61.42	63.79	60.21	71.46	71.15	59.45	75.01	80.90	78.56	71.45
Total attainment (3 Max)		1.93	1.94	1.84	1.91	1.81	2.14	2.13	1.78	2.25	2.43	2.36	2.14

Table 2.6.2.35:Program Specific Outcome attainment levels

CO-PSO mapping 2014-18

C101	A10001	PSO1	PSO2
C102	A10002		
C103	A10003		
C104	A10004		
C105	A10005		
C106	A10501		
C107	A10301		
C108	A10581		
C109	A10081	1.61	
C110	A10083		
C111	A10082		
C201	A30007		
C202	A30405		
C203	A30407	1	1
C204	A30204	1	1.2
C205	A30404	1.05	
C206	A30406	1.75	1.75
C207	A30482		1
C208	A30481	2.00	
C211	A40215	1.14	1.136
C212	A40412	1.78	
C213	A40415	1.75	1.75
C214	A40009	1.06	1.07
C215	A40411		
C216	A40410	1.02	1.02
C217	A40288		1.78
C218	A40484	1.20	
C301	A50217	1.20	1.204
C302	A50516	1.07	
C303	A50418	1.31	1.29
C304	A50422	1.81	1.81
C305	A50408	1.06	

C306	A50425	1.18	1.18
C307	A50487	1.82	1.85
C308	A50488	1.86	1.86
C311	A60010	1.20	1.204
C312	A60117		
C313	A60420		
C314	A60432	1.14	1.20
C315	A60430	1.97	1.95
C316	A60421	2.1	2.13
C317	A60494	1.08	
C318	A60493	1.86	1.864
C401	A70014		
C402	A70442	2.06	2.08
C403	A70515	1.45	1.46
C404	A70434	2.67	2.63
C405	A70436	2.95	
C406	A70440	2.25	
C407	A70086		
C408	A70499	2.83	2.83
C411	A80452	1.48	1.48
C412	A80450	1.40	1.40
C413	A80437	1.63	1.11
C414	A80087	2.99	2.99
C415	A80089		
C416	A80088	3	3
C417	A80090	3	3
B. Tech. ECE, Direct attainment (3 Max)		1.70	1.69
B. Tech. ECE, Direct attainment (100%)		56.78	56.38
B. Tech. ECE, Direct attainment (80%)		45.42	45.10
B. Tech. ECE, Indirect attainment (20%)		18	17
Total attainment, %		63.42	62.10
Total attainment (3 Max)		1.90	1.86



Above graph of the program 2014-18 shows that average attainment of both direct and indirect attainment levels. PO 10 of this academic year reached above 80% and remaining POs average attainment level reached above 60%.

Table:2.6.2.36: Program Outcome attainment levels

Batch 2013-17

Course code	University code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C101	A10001								1.90	1.87			
C102	A10002	1.09	1.13	1.18	0.95	1.14							
C103	A10003	1.09	1.07	1.13	0.95	1.08							
C104	A10004	1.21	1.23	1.29	1.05	1.28							
C105	A10005	1.08	1.13	1.15	1.05	1.16							
C106	A10501	1.08	1.17	1.19	0.95	1.20							
C107	A10301	1.09	1.13	1.08	1.15	1.10							
C108	A10581	1.41	1.41	1.41	1.41	1.41							1.41
C109	A10081	1.41	1.37	1.37	1.37	1.41							
C110	A10083		1.41		1.41					1.41	1.41	1.41	
C111	A10082	1.41	1.41	1.41	1.41	1.41							
C201	A30007	1.05	1.05	1.05	1.05	1.04							1.05
C202	A30405	1.00	1.00	1.00	1.00							1.00	1.00
C203	A30407	1.00	1.00	1.00	1.00								1.00
C204	A30204	1.80	1.83	1.83	1.83								1.75
C205	A30404	1.11	1.11	1.14	1.18								
C206	A30406	1.75	1.75	1.75	1.75	1.75							

C207	A30482	1.07	1.07										
C208	A30481	1.14	1.14	1.14	1.14	1.14							
C211	A40215	2.53	2.54	2.55	2.54	2.51							
C212	A40412	1.75	1.75	1.75	1.73	1.7							
C213	A40415	1.93	1.89	1.89	1.88								
C214	A40009					2.50	2.54	2.70	2.57			2.57	2.63
C215	A40411	2.60	2.60	2.60	2.61	2.61							
C216	A40410	1.78	1.78	1.78	1.78	1.77							
C217	A40288	1.36	1.37	1.37	1.37	1.35							
C218	A40484	2.00	2.00	2.00	2.00	2.00							
C301	A50217	1.02	1.02	1.02	1.01	1.03							
C302	A50516	1.78	1.77	1.78	1.78	1.77							
C303	A50418	1.20	1.20	1.20	1.20	1.20							
C304	A50422	1.20	1.20	1.20	1.20	1.20							
C305	A50408	1.85	1.86	1.87	1.86	1.85	1.86						
C306	A50425	1.96	1.93	1.94	1.93								
C307	A50487	1.81	1.81	1.80	1.81								
C308	A50488	2.07	2.07	2.07		2.07							
C311	A60010		2.21	2.18		2.18							2.18

C312	A60117	2.25		2.25		2.25	2.25		2.15	1.96			2.14
C313	A60420	2.13	2.14	2.12	2.12								
C314	A60432	1.82	1.77	1.78	1.79	1.75							
C315	A60430	2.80	2.85	2.91	2.79	2.80	2.68						2.86
C316	A60421	1.14	1.20	1.29	1.26								
C317	A60494	2.14	2.14	2.14		2.14		2.14		2.14		2.14	2.14
C318	A60493	1.93	1.93	1.93		1.93				1.93			1.93
C401	A70014				1.36					1.41	1.42	1.33	
C402	A70442	1.34	1.33	1.35	1.34	1.24							
C403	A70515	1.39	1.37	1.36	1.36	1.37	1.38	1.37					1.37
C404	A70434	1.37	1.39	1.50		1.40							
C405	A70436	1.85	1.87	1.86	1.94								1.86
C406	A70440	2.01	2.01	2.06	2.07				2.03			1.98	1.98
C407	A70086				2.93		2.93	2.93		2.93	2.93		
C408	A70499	3.00	3.00	3.00	3.00		3.00	3.00				3.00	
C411	A80452	2.01	2.00	2.06	1.95		1.93	2.07				2.06	
C412	A80450	2.84	2.84		2.84								
C413	A80454	2.22	2.23	2.24	2.24		2.25	2.25					
C414	A80087	2.63	2.63	2.63	2.63	2	2.63	2.63		1.5	1.5	1.5	2.5

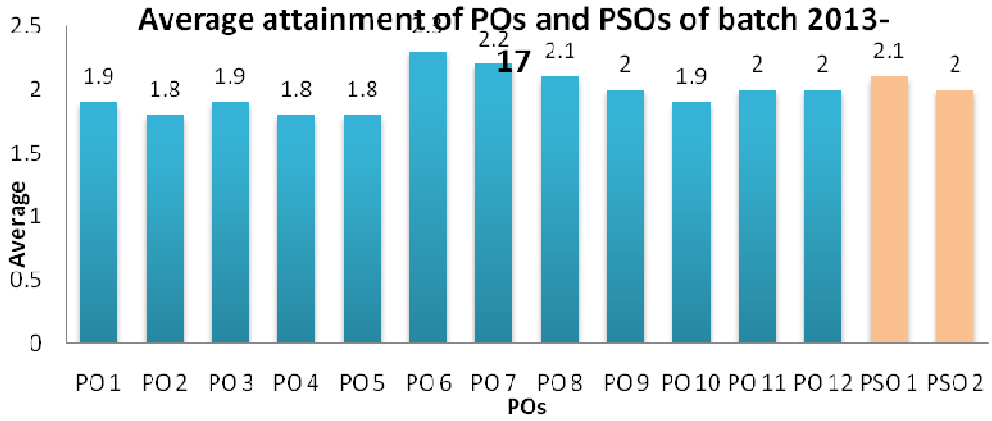
C415	A80089	2	2	2	2	1	2	1		2	2	2	3
C416	A80088	2	2	2	2	2	2	2	2	2	2	2	2
C417	A80090	3	3	2	3	3		2				2	3
B. Tech. ECE, Direct attainment (3 Max)		1.72	1.72	1.72	1.71	1.68	2.29	2.19	2.13	1.92	1.88	1.92	1.99
B. Tech. ECE, Direct attainment (100%)		57.4	57.3	57.3	57.1	55.9	76.3	73.0	71.0	63.8	62.6	63.9	66.3
B. Tech. ECE, Direct attainment (80%)		45.9	45.8	45.8	45.7	44.7	61.0	58.4	56.8	51.1	50.0	51.1	53.0
B. Tech. ECE, Indirect attainment (20%)		17	15	16	14	16	14	15	14	14	13	15	14
Total attainment, %		62.9	60.8	61.8	59.7	60.7	75.0	73.4	70.8	65.1	63.0	66.1	67.0
Total attainment (3 Max)		1.9	1.8	1.9	1.8	1.8	2.3	2.2	2.1	2.0	1.9	2.0	2.0

Table 2.6.2.37: Program Specific Outcome attainment levels

CO-PSO mapping 2013-17

Course code	University code	PSO1	PSO2
C101	A10001		
C102	A10002		
C103	A10003		
C104	A10004		
C105	A10005		
C106	A10501		
C107	A10301		
C108	A10581		
C109	A10081		
C110	A10083		
C111	A10082		
C201	A30007		
C202	A30405	1	1
C203	A30407	1.2	1.4
C204	A30204	1	
C205	A30404	1.14	1.17
C206	A30406		1.75
C207	A30482	1.07	1.068
C208	A30481	1.14	1.136
C211	A40215	2.51	
C212	A40412	1.75	1.75
C213	A40415	1.88	1.89
C214	A40009		
C215	A40411	2.62	2.62
C216	A40410		1.79
C217	A40288	1.35	
C218	A40484	2.00	
C301	A50217	1.86	
C302	A50516	1.31	1.28
C303	A50418	1.2	2
C304	A50422	2	
C305	A50408	2.70	2.70
C306	A50425	1.92	1.90

C307	A50487	1.93	1.932
C308	A50488	2.07	2.068
C311	A60010		
C312	A60117		
C313	A60420	2.12	2.13
C314	A60432	2.06	
C315	A60430	2.8	2.83
C316	A60421	1.16	
C317	A60494	2.14	2.16
C318	A60493		1.932
C401	A70014		
C402	A70442	1.35	1.37
C403	A70515	1.37	1.36
C404	A70434	2.14	2.14
C405	A70436	1.86	
C406	A70440	3	1.8
C407	A70086		
C408	A70499	3	3
C411	A80452	2.03	2.05
C412	A80450	2.84	
C413	A80454	1.8	1.6
C414	A80087	3	3
C415	A80089	3	3
C416	A80088	3	2.33
C417	A80090	3	3
B. Tech. ECE, Direct attainment (3 Max)		1.98	1.97
B. Tech. ECE, Direct attainment (100%)		66.1	65.8
B. Tech. ECE, Direct attainment (80%)		52.9	52.6
B. Tech. ECE, Indirect attainment (20%)		16	15
Total attainment, %		68.9	67.6
Total attainment (3 Max)		2.1	2.0



Above graph for the Program 2013-17 shows that average attainment of both direct and indirect attainment levels. PO 6, 7 of this program reached 70% and remaining POs average attainment level reached 60%.

Table: 2.6.2.38: Program Outcome attainment levels

Batch 2012-16

Course code	University code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C101	A10001								2.85	2.60			
C102	A10002	1.06	1.07	1.00	1.15	1.04							
C103	A10003	1.90	1.97	1.90	2.00								
C104	A10004	2.61	2.57	2.63	2.55	2.58							
C105	A10005	1.78	1.78	1.75	1.80	1.77							
C106	A10501	1.88	1.95	1.90	1.90	1.95							
C107	A10301	1.06	1.08	1.05	1.10					1.05	1.10	1.05	1.08
C108	A10581	1.61	1.61	1.61	1.61	1.61							
C109	A10081	1.2	1.2	1.2	1.2	1.2							

		7	7	7	7	7							
C110	A10083		1.93		1.93					1.93	1.93	1.93	
C111	A10082	1.27	1.27	1.27	1.27	1.27							
C201	53007	1.05	1.05	1.05	1.05	1.04			1.04	1.06			1.05
C202	53019	1.00	1.00	1.00	1.00							1.00	1.00
C203	53013	1.00	1.00	1.00	1.00								1.00
C204	53020	2.69	2.70	2.70	2.68								2.71
C205	53009	2.68	2.69	2.70	2.75	2.70							2.61
C206	53021	1.75	1.75	1.75	1.75	1.75							1.75
C207	53606	1.34	1.34	1.34	1.34								
C208	53607	1.41	1.41	1.41	1.41	1.41							
C211	54019	2.72	2.72	2.72	2.72								
C212	54020	1.95	1.95	1.95	1.95								
C213	54021	2.70	2.70	2.70	2.70								
C214	54010	2.62	2.62	2.62	2.62								
C215	54011	1.16	1.16	1.16	1.16								
C216	54606	2.07	2.07	2.07	2.07	2.07							2.07
C217	54607	1.27	1.27	1.27	1.27	1.27							1.27
C218	54608	1.20	1.20	1.20	1.20	1.20							1.20

C301	55024	1.80	1.80	1.81	1.80	1.79	1.80						
C302	55022	1.87	1.87		1.80								
C303	55021	2.4	2.6	2	2.2	2.5	1.75						
C304	55012	1	1.2	1.6	1.2		1						1.2
C305	55023	1.92	1.94	1.94		1.94							
C306	55009	1.70	1.85	1.84	1.88								
C307	55606	2.07	2.07			2.07							
C308	55607	1.5	1	2.6	2.2	3							
C311	56026	2.18	2.18	2.17	2.18								
C312	56027	1.94	1.97	2.09	2.05								
C313	55023		1.39	1.39		1.39							1.39
C314	56012	2.04	1.96	2.08	2.01	2.01	2.01						2.01
C315	56024	2.04	2.06		2.00	2.02							2.03
C316	56608				2.86		2.86	2.86		2.86	2.86		
C317	56607	2.07	2.07	2.07		2.07				2.07			2.07
C318	56606	2.14	2.14	2.14		2.14		2.14		2.14		2.14	2.14
C401	57034				2.64					2.60	2.56	2.61	
C402	57035	2.13	2.13	2.13	2.13								
C403	57036	2.77	2.78	2.82		2.88							2.79
C404	57037	2.6	2.5	2.6	2.5	2.5	2.6	2.5					2.50

		0	9	0	8	0	0	0					
C405	57041	2.77	2.73	2.73	2.69								2.73
C406	57043	2.88	2.88	2.90	2.91				2.82			2.74	2.74
C407	57607	2.80	2.80	2.80	2.80								
C408	57608	1.68	1.68	1.68	1.68		1.68	1.68				1.68	
C411	58024	2.02	2.04	2.04	2.04								
C412	58028	2.91	2.91		2.93								
C413	58032	2.25	2.25	2.25	2.25		2.25	2.25					
C414	A80087	2.63	2.63	2.63	2.63	2.00	2.63	2.63		1.50	1.50	1.50	2.50
C415	A80089	2.00	2.00	2.00	2.00	1.00	2.00	1.00		2.00	2.00	2.00	3.00
C416	A80088	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
C417	A80090	3.00	3.00	2.00	3.00	3.00		2.00				2.00	3.00
B. Tech. ECE, Direct attainment (3 Max)		1.97	1.96	1.95	1.99	1.91	2.05	2.12	2.18	1.98	1.99	1.88	1.99
B. Tech. ECE, Direct attainment (100%)		65.5	65.2	64.9	66.5	63.6	68.4	70.6	72.6	66.1	66.4	62.6	66.4
B. Tech. ECE, Direct attainment (80%)		52.4	52.2	51.9	53.2	50.9	54.7	56.5	58.1	52.9	53.1	50.1	53.2
B. Tech. ECE, Indirect attainment (20%)		12	13	13	12	12	12	13	12	13	14	14	14
Total attainment, %		64.4	65.2	64.9	65.2	62.9	66.7	69.5	70.1	65.9	67.1	64.1	67.2

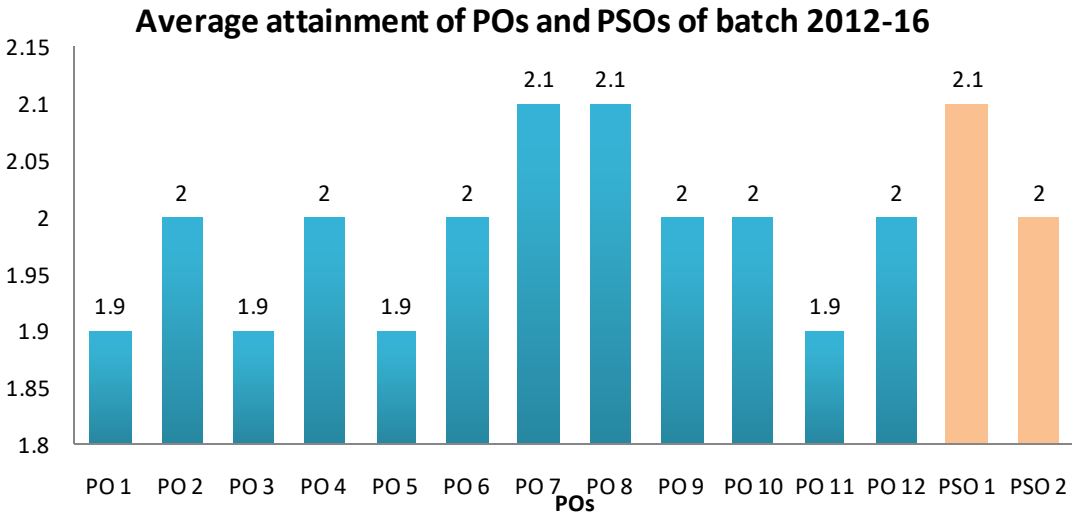
Total attainment (3 Max)	1.9	2.0	1.9	2.0	1.9	2.0	2.1	2.1	2.0	2.0	1.9	2.0

Table 2.6.2.39: Program Specific Outcome attainment levels

CO-PSO mapping 2012-16

Course code	University code	PSO1	PSO2
C101	A10001		
C102	A10002		
C103	A10003		
C104	A10004		
C105	A10005		
C106	A10501		
C107	A10301		
C108	A10581		
C109	A10081		
C110	A10083		
C111	A10082		
C201	53007		
C202	53019	1	1
C203	53013	1	1
C204	53020	2.7	
C205	53009	2.8	
C206	53021	1.75	1.75
C207	53606	1.34	
C208	53607	1.14	1.136
C211	54019	2.72	2.72
C212	54020	1.95	1.98
C213	54021	2.70	2.75
C214	54010	2.62	2.60
C215	54011	1.16	1.20
C216	54606	2.07	2.068
C217	54607	1.27	1.272
C218	54608	1.20	1.204
C301	55024	1.94	1.94
C302	55022	2.71	2.68
C303	55021	1.88	1.88

C304	55012	1.79	
C305	55023	1.89	1.89
C306	55009	1.83	1.89
C307	55606	2.07	2.07
C308	55607	2.07	2.068
C311	56026	2.15	2.17
C312	56027	1.95	
C313	55023		
C314	56012	2.04	2.05
C315	56024		
C316	56608		
C317	56607		2.068
C318	56606	2.14	
C401	57034		
C402	57035	2.15	2.14
C403	57036	2.74	2.75
C404	57037	2.59	2.60
C405	57041	2.73	
C406	57043	2.88	
C407	57607	2.80	2.76
C408	57608	1.68	1.68
C411	58024	2.11	2.03
C412	58028	2.87	
C413	58032	2.25	2.25
C414	A80087	2.50	2.50
C415	A80089	2	2
C416	A80088	3	2
C417	A80090	3	3
B. Tech. ECE, Direct attainment (3 Max)		2.13	2.03
B. Tech. ECE, Direct attainment (100%)		70.9	67.8
B. Tech. ECE, Direct attainment (80%)		56.7	54.2
B. Tech. ECE, Indirect attainment (20%)		12	13
Total attainment, %		68.7	67.2
Total attainment (3 Max)		2.1	2.0



Above graph for the program 2012-16 shows that the average attainment of both direct and indirect attainment levels reached 60%.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Evaluation of Attainment of Programme outcomes and Course Outcomes

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

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

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

(B) PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1

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.

. Course Outcomes (COs) (SAR should include course outcomes of one course from each semester of study, however, should be prepared for all courses and made available as evidence, if asked)

The course outcomes are prepared for each course (each subject) in consideration to the syllabus prescribed by the JNTUH. One course outcome is formulated for each unit of the course by the respective subject faculty. Revised Bloom's Taxonomy action verbs are used to formulate the course outcomes. These are drafted in the background of Mission Statement, PEOs prepared by the college for the B.Tech computer science programme and program outcomes envisaged by NBA.

The following table shows the course outcomes for a selected course from 3rd to 8th semester of **2017-2018** Academic year.

Course Outcomes (COs)

Course Name :(Object Oriented Programming through Java) **Year &Sem:** II-I
Subject Code:: CS215ES

S.No	COURSE NAME	COURSE OUTCOMES
1	C215.1	Solve real world problems using OOP techniques(TL3)
2	C215.2	Understand the use of packages and abstract classes. (TL2)
3	C215.3	Able to create user defined exceptions and handle them. (TL3)
4	C215.4	Develop multithreaded applications with synchronization. (TL3)
5	C215.5	Able to solve problems using java collection framework and I/o classes. (TL3)
6	C215.6	Design applets for web applications and GUI based applications(TL3)

Course Name:(Formal Languages and Automata Theory) **Year &Sem:** II-II
Subject Code:CS404ES

S.No	COURSE NAME	Course Outcome
1	C204.1	Illustrate finite automata,Inter -conversion, equivalence and minimization, language recognisers(TL2)
2	C204.2	Construct finite automata from regular grammer and regular grammer to automata(TL6)
3	C204.3	Understand sentential forms,Derivations using Context free grammer, Ambiguity of context free grammers(TL2)
4	C204.4	Design push down automata , Equivalence and interconversion of PDA's and CFG's(TL6)
5	C204.5	Describe Turing machine and language accepted by turing machines-programming techniques, and conversion among CFL's and PDA's(TL2)
6	C204.6	Differentiate decidablility of problems and completeness of language(TL4)

Course Name: (Computer networks) **Year &Sem:** III-I **Subject Code:** A50515

S.No	C.O	Course Outcome
1	C316.1	Knowing Network and network communication, OSI and TCP/IP model(TL1)

2	C316.2	Understanding medium access layer and its operation. Appraise the Functionalities of different networking devices (TL2)
3	C316.3	Understand the issues involved in network layer(TL2)
4	C316.4	Demonstrate the types of routing protocols and Congestion control mechanisms(TL3)
5	C316.5	Illustrating the IPv4 and IPv6 formats, fragmentation and tunneling process(TL3)
6	C316.6	Understanding the UDP and TCP transport layer protocol and compare Application layer protocols such as HTTP, FTP. How client server communication takes place. (TL2)

Course Name: (Web Technologies) **Year &Sem:** III-II **Subject Code:**CS60512

S.No	C.O	Course Outcome
1	C326.1	Understanding the server side scripting through PHP(TL2)
2	C326.2	Understanding XML, how to parse and using XML data in web pages(TL2)
3	C326.3	Generate server side scripting with Java servlets(TL6)
4	C326.4	Demonstrate Database Connectivity using JDBC(TL3)
5	C326.5	Support server side scripting with JSP(TL5)
6	C326.6	Gain and applying knowledge of client side scripting, validations of forms and AJAX programming(TL3)

Course Name: (Linux Programming) **Year &Sem:** IV-I **Subject Code:**A70517

S.No	C.O	Course Outcome
1	C411.1	List the Linux utilities for file processing(TL1)
2	C411.2	Illustrate the system calls to create, manage and control the processes in UNIX file System(TL3)
3	C411.3	Develop the methods to overcome conflicts arise in the processes(TL3)
4	C411.4	Classify the various system calls used in signal management(TL4)
5	C411.5	Analyze Inter Process Communication (IPC) and Semaphores for message passing and synchronization between processes(TL4)
6	C411.6	Design the socket programming for client/server architecture(TL5)

Course Name: (Web Services) **Year &Sem:** IV-II **Subject Code:** A80551

S.No	C.O	Course Outcome
1	C402.1	Understand the details of web services Evolution of Distributed Computing. (TL2)
2	C402.2	Fundamental Knowledge about SOAP and its Operations. (TL1)
3	C402.3	Describing Web Services about WSDL. (TL2)
4	C402.4	Describe web service life cycle using WSDL tools. (TL2)
5	C402.5	Identifying web services discovery mechanisms-UDDI. (TL2)
6	C402.6	Implement the Web service client and server with interoperable p[illegible] (TL3)

The following table shows the course outcomes for a selected course from 3rd to 8th semester of **2016-2017** Academic year.

Course Outcomes (COs)
Course Name: (Data Structures) **Year &Sem:** II-I **Subject Code:** A30502

S.No	C.O	Course Outcome
1	C302.1	Understand the basic concepts of C++. learn data structures to represent data items in real world problems. Ability to Analyze the time and space complexities of algorithms. .(TL2)
2	C302.2	Design programs using a variety of data structures such as stacks, queues. .(TL3)
3	C302.3	Implement binary trees, Priority Queues,Heap data structure .(TL3)
4	C302.4	Analyze and implement various kinds of searching and sorting techniques. .(TL4)
5	C302.5	Understand graphs and balanced search trees.(TL2)

Course Name: (Database Management Systems) **Year &Sem:** II-II
Subject Code: A40507

S.No	C.O	Course Outcome
1	C407.1	Demonstrate the basic elements of a relational database management system(TL3)
2	C407.2	Design entity relationship and convert into RDBMS and formulate SQL queries on the respect data. (TL3)
3	C407.3	Identify need of schema refinement and Apply normalization techniques for the development of application software's. (TL1)
4	C407.4	Identify and apply the basics of transaction management and concurrency control. (TL1)
5	C407.5	Understanding various indexing technique and basic database storage structures and access techniques. (TL2)

Course Name: (Compiler Design) **Year &Sem:** III-I
Subject Code: A50514

S.No	C.O	Course Outcome
1	C802.1	Describe translation in each phase of the compilation.(TL2)
2	C802.2	Design parsers for the compilers. .(TL3)
3	C802.3	Understand different forms of Intermediate code .(TL3)
4	C802.4	Perform Code Optimization and understanding runtime environment .(TL2)
5	C802.5	Design code generation schemes on machine dependent optimizations.(TL3)

Course Name: (Object Oriented Analysis and Design) **Year &Sem:** III-II
Subject Code: A60524

S.No	C.O	Course Outcome
1	C402. 1	Understand the object- oriented software development process, object oriented methodologies and work flows(TL2)
2	C402. 2	Create a system architecture (the Architecture model) supporting the nonfunctional requirements and development constraints(TL6)
3	C402. 3	create a system design and behavioral model for the given functional requirements using activity diagrams (TL6)
4	C402. 4	design a dynamic behavioral model of a system. (TL3)
5	C402. 1	Analyze designs based on design principles, patterns, and heuristics(TL4)

Course Name: (Design Patterns) **Year &Sem:** IV-I
Subject Code: A70534

S.No	C.O	Course Outcome
1	C412.1	Construct design patterns to the recurring problems in software development.(TL1)
2	C412.2	Justify the Design Patterns for Case study of Document Editor Be able to determine the applications context refers to creational, structural and behavioural. (TL3)
3	C412.3	Demonstrate the Creational, Structural and Behavioral Patterns for Complex designs patterns and Represent interfaces to be implemented between the objects and classes (TL3)
4	C412.4	Understand the fundamental notions of data abstraction, the appropriate roles of sub typing and inheritance. (TL2)
5	C412.5	Design problems by using design patterns. (TL3)

Course Name: (Webservices) **Year &Sem:** IV-II
Subject Code: A80014

S.No	C.O	Course Outcome
1	C403.1	Apply the concepts & principles of management in real life industry(TL3)
2	C403.2	Design & develop organization chart & structure for an enterprise(TL3)
	C403.3	Apply PPC techniques, Quality Control, Work-study principles in real life industry. (TL3)
4	C403.4	Maintain Materials departments, & Determine EOQ (TL3)
5	C403.5	Identify Marketing Mix Strategies for an enterprise. (TL2)

The following tables show the course outcomes for a selected course from 3rd to 8th semester of **2015-2016** Academic year.

Course Outcomes (COs)

Course Name: (Data Structures) **Year &Sem:** II-I
Subject Code: A30502

S.No	C.O	Course Outcome
1	C213.1	Understand the basic concepts of C++. Learn data structures to represent data items in real world problems. Ability to Analyze the time and space complexities of algorithms. .(TL2)
2	C213.2	Design programs using a variety of data structures such as stacks, queues. .(TL3)
3	C213.3	Implement binary trees, Priority Queues,Heap data structure .(TL3)
4	C213.4	Analyze and implement various kinds of searching and sorting techniques. .(TL4)
5	C213.5	Understand graphs and balanced search trees.(TL2)

Course Name: (Database Management Systems) **Year &Sem:** II-II
Subject Code:A40507

S.No	C.O	Course Outcome
1	C202.1	demonstrate the basic elements of a relational database management system(TL3)
2	C202.2	Design entity relationship and convert into RDBMS and formulate SQL queries on the respect data. (TL3)
3	C202.3	Identify need of schema refinement and Apply normalization techniques for the development of application software's. (TL3)
4	C202.4	Identify and apply the basics of transaction management and concurrency control. (TL2)
5	C202.5	Understanding various indexing technique and basic database storage structures and access techniques. (TL2)

Course Name: (Operating System) **Year &Sem:** III-I
Subject Code: A50510

S.No	C.O	Course Outcome
1	C314.1	Apply optimization techniques for the improvement of system performance. (TL3)
2	C314.2	list the synchronous and asynchronous communication mechanisms in their respective OS(TL1)
3	C314.3	Illustrate different Memory Management Techniques and page replacement algorithms(TL4)

4	C314.4	Designing File system Structure and compiling different Disk scheduling Algorithms(TL3)
5	C314.5	Distinguish between Deadlock Prevention, Avoidance and Recovery from Deadlock(TL3)

Course Name: (**Object Oriented Analysis And Design**) **Year &Sem: I**II-II
Subject Code:A60524

S.No	C.O	Course Outcome
1	C303.1	Understand the object- oriented software development process, object oriented methodologies and work flows(TL2)
2	C303.2	Create a system architecture (the Architecture model) supporting the nonfunctional requirements and development constraints(TL6)
3	C303.3	create a system design and behavioral model for the given functional requirements using activity diagrams (TL6)
4	C303.4	design a dynamic behavioral model of a system. (TL3)
5	C303.5	Analyze designs based on design principles, patterns, and heuristics(TL4)

Course Name: (**Design Patterns**) **Year &Sem:** IV-I
Subject Code: A70530

S.No	C.O	Course Outcome
1	C412.1	Construct design patterns to the recurring problems in software development.(TL1)
2	C412.2	Justify the Design Patterns for Case study of Document Editor Be able to determine the applications context refers to creational, structural and behavioural. (TL3)
3	C412.3	Demonstrate the Creational, Structural and Behavioral Patterns for Complex designs patterns and Represent interfaces to be implemented between the objects and classes (TL3)
4	C412.4	Understand the fundamental notions of data abstraction, the appropriate roles of sub typing and inheritance. (TL2)
5	C412.5	Design problems by using design patterns. (TL3)

Course Name: (**Web services-**) **Year &Sem:** IV-II
Subject Code:A80551

S.No	C.O	Course Outcome
1	C403.1	Apply the concepts & principles of management in real life industry(TL3)
2	C403.2	Design & develop organization chart & structure for an enterprise(TL3)
	C403.3	Apply PPC techniques, Quality Control, Work-study principles in real life industry. (TL3)

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4	C403.4	Maintain Materials departments, & Determine EOQ (TL3)
5	C403.5	Identify Marketing Mix Strategies for an enterprise. (TL2)

CO-PO matrices of courses selected above subjects (six matrices to be mentioned; one per semester from 3rd to 8th semester)

The POs are assigned to each course outcomes, for all courses (subject) in Academic year. The course outcomes are identified and framed by Team of course Instructors / concern subject faculty maps the course outcomes after thoroughly understanding the program outcomes .each CO(course outcome) of a course is mapped with appropriate PO(s). Based on the relevancy between CO and PO, each PO is given correlation level as high (3) or moderate (2) or slight (1) attainment levels. Further, an average of the correlation levels of each PO is made on the scale of high (3). CO-PO matrices are reviewed in the department academic committee before finalization. Same procedure is followed for CO-PSO matrices..

The following tables show the CO-PO matrix for a selected course from 3rd to 8th semester of **2017-2018** academic year.

Course Name: (Object Oriented Programming Through Java) **Year&Sem :** II-I

Subject Code: CS215ES

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C215.1**	3	1	1	1	1						1	3
2	**C215.2**	3	2	1	1							1	2
3	**C215.3**	1	1		1	1						2	2
4	**C215.4**	1	1	1	1	1						2	2
5	**C215.5**	1	2	1	1	2						1	2
6	**C215.6**	1	1	1	3	2						2	2
	AVG	2	2	2	2	2	_	_	_	_	_	2	3

Course Name: (Formal Languages and Automata Theory) Year&Sem : II-II

Subject Code::CS404ES

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C204.1**	3	3	1	3								1
2	**C204.2**	3	2	1	2								1
3	**C204.3**	3	3	1	2								1
4	**C204.4**	2	3	1	3								1
5	**C204.5**	2	3	1	3								1

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6	**C204.6**	3	3	1	3								1
	AVG	3	3	2	3								2

Course Name: computer networks **Year&Sem :** III-I
Subject Code: A50515

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C316.1**	1	2	1	2	2							1
2	**C316.2**	2	3	2	3	3							1
3	**C316.3**	3	3	1	3	3							1
4	**C316.4**	3	3	1	3	3							1
5	**C316.5**	3	3	1	2	3							1
	AVG	3	3	2	3	3							1

Course Name: (Web Technologies) Year&Sem : III-II
Subject Code: A60512

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C326.1**	2	2	2	3	3	1	1				1	2
2	**C326.2**	2	2	2	2	2							1
3	**C326.3**	2	1	1	2	2						2	2
4	**C326.4**	2	1	1	2	2						2	2
5	**C326.5**	2	1	1	2	3						1	1
	AVG	2	2	2	3	3	1	1	_	_	_	2	2

Course Name;(Linux Programming) **Year&Sem :** IV-I

Subject Code::A70517

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C411.1**	2	2	2	1	2							2
2	**C411.2**	2	1	2	2								1
3	**C411.3**	1	2	1	2	2							2
4	**C411.4**	1	1	1	2	2							2
5	**C411.5**	1	1	1	2	1							2
	AVG	2	2	2	2	2							2

Course Name: (Web Services) Year&Sem : IV-II

Subject Code: A80551

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C402.1**	1	2	1	1	2							1
2	**C402.2**	1	1	1	1	2							1
3	**C402.3**		1	1		3							1
4	**C402.4**	1	1	1		2							1
5	**C402.5**	1	1	1		2							1
	AVG	1	2	1	1	3							1

Year of Study: 2016-2017

Course Name: (Data Structures) Year&Sem : II-I
Subject Code: A30502

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C213.1**	1	1	1	1	2							3
2	**C213.2**	2	2	2	2	1							3
3	**C213.3**	2	2	1	1	1							3
4	**C213.4**	2	1	1	2	1							3
5	**C213.5**	2	1	1	1	2							3
	AVG	2	2	2	2	2							3

Course Name: (Database Management Systems) Year&Sem : II-II
Subject Code: A40507

S.No	Course Outcome	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C202.1**	1	1	1	1	1							1
2	**C202.2**	2	2	1	1	1							1
3	**C202.3**	2	2	1	1								
4	**C202.4**	2	2	1	1								
5	**C202.5**	2	2	1	1	2							1
	AVG	2	2	2	2	2							1

Course Name: (Compiler Design) Year&Sem : III-I
Subject Code: A50514

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C314.1**	2	2	1	1	1							1
2	**C314.2**	2	2	1	2	1							1
3	**C314.3**	2	1	1	1	1							1
4	**C314.4**	2	2	1	1	1							1
5	**C314.5**	2	2	2	2	2	2	2	2	2	2	2	2
	AVG	2	2	2	2	2	1	1	1	1	1	1	2

Course Name: (Object Oriented Analysis And Design) Year&Sem : III-II

Subject Code: A60524

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C323.1	1	2		1	2				1			1
2	C323.2	1	2	2	2	3				1		3	3
3	C323.3	1	2	1	2	3				1		3	3
4	C323.4		1		1	3				1		3	3
5	C323.5				1	2				1		2	
	AVG	1	2	1	2	3				1		3	2

Course Name: (Design Patterns) Year &Sem : IV-I

Subject Code: A57054

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C412.1	2	2	1	2	1							
2	C412.2	2	2	1	3	3						1	
3	C412.3	2	2	1	3	1						2	2
4	C412.4	2	2	1	3	1						2	2
5	C412.5	2	1	1	3	1						2	2
	AVG	2	2	1	3	2						2	2

Course Name:(Web services) Year&Sem : IV-II

Subject Code: A58007

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C426.1	2	2						2	1		2	2
2	C426.2	2	2	1	1					1		1	1
3	C426.3	2	1	1	1					1		2	1
4	C426.4	2	1	1	1					1		3	1
5	C426.5	2	1	1	1					1		1	1
	AVG	2	2	1	1				1	1		2	2

Year of Study: 2015-2016

Course Name: (Data Structures) Year&Sem : II-I
Subject Code: A30502

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C213.1**	1	1	1	1	2							2
2	**C213.2**	2	1	2	1	1							1
3	**C213.3**	1	1	1	1	1							2
4	**C213.4**	2	1	1	2	1							1
5	**C213.5**	2	1	1	1	2						1	1
	AVG	2	1	2	2	2						1	2

Course Name: (Database Management Systems) Year&Sem : II-II
Subject Code:A40507

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C222.1**	1	1	1	1	1							1
2	**C222.2**	2	2	1	1	1							1
3	**C222.3**	2	2	1	1								
4	**C222.4**	2	2	1	1								
5	**C222.5**	2	2	1	1	2							1
	AVG	2	2	1	1	1							1

Course Name: Operating System Year&Sem : III-I
Subject Code:A55031

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C314.1**	1	1		1								1
2	**C314.2**	2	3	1	3								2
3	**C314.3**	2	2	1	3								1
4	**C314.4**	1	1	1	2								2
5	**C314.5**	2	1	1	2								2
	AVG	2	2	1	3								

Course Name: Object Oriented Analysis And Design Year&Sem : III-II
Subject Code:A56028

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C323.1**	1	2		1	2				1			1
2	**C323.2**	1	2	2	2	3				1		3	3
3	**C323.3**	1	2	1	2	3				1		3	3
4	**C323.4**		1		1	3				1		3	3
5	**C323.5**				1	2				1		2	
	AVG	1	2	1	2	3				1		3	2

Course Name: Design Patterns Year&Sem : IV-I
Subject Code: A57054

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C412.1**	2	2	1	2	1							
2	**C412.2**	2	2	1	3	3						1	
3	**C412.3**	2	2	1	3	1						2	2
4	**C412.4**	2	2	1	3	1						2	2
5	**C412.5**	2	1	1	3	1						2	2
	AVG	2	2	1	3	2						2	2

Course Name: Web services Year&Sem : IV-II
Subject Code:A58035

S.No	Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C426.1**	**1**	**2**	**1**	**1**	**2**							**1**
2	**C426.2**	1	1	1	1	2							1
3	**C426.3**		1	1		3							1
4	**C426.4**	1	1	1		2							1
5	**C426.5**	1	1	1		2							1
	AVG	1	2	1	1	3							1

Observations

- During 2017-2018 academic year six course outcomes and in academic year 2016-2017, 2015-2016 five Course outcomes are superimposed in the syllabus.

- The course outcomes are achievable and possible to assess through testing and evaluation, examinations (theory and practical), assignments and seminars.
- Both summative and formative evaluations are considered for designing the outcomes.

CO-PSO matrices of courses (six matrices to be mentioned; one per semester from 3rd to 8th semester)

Year of Study: 2017-2018

Course Name: Object Oriented Programming Through Java III -SEMESTER (II/I)
Subject Code::CS215ES

S.No	Course Outcome	PSO1	PSO2
1	C215.1	1	2
2	C215.2	1	2
3	C215.3	1	2
4	C215.4	1	2
5	C215.5	1	2
6	C215.6	1	2
	AVG	2	3

Course Name : FORMAL LANGUAGES & AUTOMAT THEORY IV -SEMESTER (II/II)
Subject Code: CS404ES

S.No	Course Outcome	PSO1	PSO2
1	C204.1	2	1
2	C204.2	2	1
3	C204.3	1	1
4	C204.4	1	1
5	C204.5	2	1
6	C204.6	1	1
	AVG	2	2

Course Name: COMPUTER NETWORKS V -SEMESTER (III/I)
Subject Code: A50515

S.No	Course Outcome	PSO1	PSO2
1	C316.1	1	1
2	C316.2	1	1
3	C316.3	1	1
4	C316.4	2	1
5	C316.5	2	1
6	C316.6	1	1
	AVG	2	2

Course Name: Web Technologies VI -SEMESTER (III/II)
Subject Code: A60512

S.No	Course Outcome	PSO1	PSO2
1	C326.1	2	2
2	C326.2	2	2
3	C326.3	2	2
4	C326.4	2	2
5	C326.5	2	2
6	C326.6	2	2
	AVG	3	3

Course Name: LINUX PROGRAMMING VII -SEMESTER (IV/I)
Subject Code: A7051

S.No	Course Outcome	PSO1	PSO2
1	C411.1	1	2
2	C411.2	3	3
3	C411.3	3	3
4	C411.4	3	3
5	C411.5	3	3
6	C411.6	3	2
	AVG	3	3

Course Name: WEB SERVICES VIII -SEMESTER (IV/II)
Subject Code: A80551

S.No	Course Outcome	PSO1	PSO2
1	C402.1	2	2
2	C402.2	2	2
3	C402.3	1	1
4	C402.4	1	2
5	C402.5	1	1
6	C402.6	1	1
	AVG	2	2

Year of Study: 2016-2017

Course Name: Data Structures III -SEMESTER (II/I)
Subject Code: A30502

S.No	Course Outcome	PSO1	PSO2
1	C213.1	1	2
2	C213.2	2	2
3	C213.3	2	2
4	C213.4	1	2
5	C213.5	2	2
	AVG	2	2

Course Name: Database Management Systems IV -SEMESTER (II/II)
Subject Code: A40507

S.No	Course Outcome	PSO1	PSO2
1	C222.1	1	2
2	C222.2	1	1
3	C222.3	1	1
4	C222.4	1	1
5	C222.5	1	1
	AVG	2	2

Course Name: Computer Networks V -SEMESTER (III/I)
Subject Code: A50514

S.No	Course Outcome	PSO1	PSO2
1	C314.1	1	1
2	C314.2	1	1
3	C314.3	1	1
4	C314.4	2	1
5	C314.5	1	1
	AVG	2	1

Course Name: Web Technologies VI -SEMESTER (III/II)
Subject Code: A60524

S.No	Course Outcome	PSO1	PSO2
1	C323.1	2	2

2	C323.2	2	2
3	C323.3	2	2
4	C323.4	2	2
5	C323.5	2	2
	AVG	2	2

Course Name: Linux programming VII -SEMESTER (IV/I)
Subject Code: A57054

S.No	Course Outcome	PSO1	PSO2
1	C412.1	1	2
2	C412.2	3	3
3	C412.3	3	3
4	C412.4	3	3
5	C412.5	3	2
	AVG	3	3

Course Name: Web Services VIII -SEMESTER (IV/II)
Subject Code: A58007

S.No	Course Outcome	PSO1	PSO2
1	C426.1	2	2
2	C426.2	2	2
3	C426.3	1	1
4	C426.4	1	2
5	C426.5	1	1
	AVG	2	2

Year of Study: 2015-2016

Course Name: Data Structures III -SEMESTER (II/I)
Subject Code: A30502

S.No	Course Outcome	PSO1	PSO2
1	C213.1	1	1
2	C213.2	1	1
3	C213.3	1	
4	C213.4	1	1
5	C213.5	2	2
	AVG	2	1

Course Name: Database Management Systems IV -SEMESTER (II/II)
Subject Code:A40507

S.No	Course Outcome	PSO1	PSO2
1	C222.1	1	2
2	C222.2	1	1
3	C222.3	1	1
4	C222.4	1	1
5	C222.5	1	1
	AVG	1	2

Course Name: Operating System V -SEMESTER (III/I)
Subject Code:A55031

S.No	Course Outcome	PSO1	PSO2
1	C314.1	1	1
2	C314.2	2	1
3	C314.3	1	1
4	C314.4	1	1
5	C314.5	1	1
	AVG	2	1

Course Name: Object Oriented Analysis And Design VI -SEMESTER (III/II)
Subject Code: A56028

S.No	Course Outcome	PSO1	PSO2
1	C323.1		2
2	C323.2	1	3

3	C323.3	1	3
4	C323.4	1	3
5	C323.5	1	1
	AVG	1	3

Course Name: Design Patterns VII -SEMESTER (IV/II)
Subject Code: A57054

S.No	Course Outcome	PSO1	PSO2
1	C412.1	1	1
2	C412.2	1	2
3	C412.3	2	2
4	C412.4	1	2
5	C412.5	1	2
	AVG	2	2

Course Name: Web services VIII -SEMESTER (IV/II)
Subject Code:A58035

S.No	Course Outcome	PSO1	PSO2
1	C426.1	2	2
2	C426.2	2	2
3	C426.3	1	1
4	C426.4	1	2
5	C426.5	1	1
	AVG	2	2

Program level Course-PO matrix of all courses including first year courses

From the above tables i.e. the mapping matrices of COs with POs and PSOs program level course – PO and PSO matrices are formulated. These matrices consist of the average values of POs and PSOs for all courses in the program.

CO-PO mapping for A Y : 2014-2018

S. No	Course code/ Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12	Average programme outcomes (max 3.00)
I Semester (I/I)														
1	English A10001				1						3		2	
2	Mathematics-I	3	2	1	1	1							1.6	

	A10002													
3	Mathematical Methods A10003	2	2	1	2	2								1.8
4	Engineering Physics A10004	3	2	1	2	2								2
5	Engineering Chemistry A10005	1	1	1		1								1
6	Computer Programming A10501	2	3	1	1	1							1	1.5
7	Engineering Drawing A10301	2			1	2								1.66
8	Computer Programming lab A10581	3	3	1	1	1							1	1.66
9	Engineering chemistry and physics lab A10081	3	3	1	1	1							1	1.66
10	Engineering/IT workshop A10082	3	3	1	1	1							1	1.66
11	English Language Communication skills Lab A10083	3	3	1	1	1							1	1.66
						II-I								
17	probability And Statistics A30008	2	2	2	1	2			1				1	1.57
18	Mathematical Foundations Of Computer Science A30504	3	2	1	3	2						1	3	2.14
19	Data Structures A30502	2	1	2	2	2						1	2	1.71
20	Digital Logic Design A30401	3	2	2	2			1					2	

21	Basic Electrical Engineering A30202	2	2	2	2	2					1	2	3	2
22	Electronic Devices and Circuits -A30404	3	2	1	3	2						1	3	2.14
23	Electrical and electronics lab A30282	1	1	1	1	1								1
24	Data Structures lab-A30582	3	2	1	3	2						1	3	2.14
IV Semester (II/II)														
25	Computer Organization A40506	2	2	1	1	1								1.4
26	Database Management Systems A40507	2	2	1	1	1							1	1.33
28	JAVA Programming A40503	2	2	1	2	2						2	3	2
29	Formal Language And Automata Theory A40509	3	3	1	3								1	2.2
30	Design And Analysis Of Algorithms A40508	2	1	2	1	2						2	2	1.71
31	Environmental Studies A40009	1	1	1	1	1								1
32	JAVA Programming LAB A40585	3	3	1	1	1							1	1.66
33	Database Management Systems LAB A40584	2	1	2	2	2							3	2
	V Semester (III/I)													
34	Principles Of Programming	2	2	1	1								1	1.4

	Language A50511													
35	Disaster Management A50117	1		2	1		1		2	1			2	1.42
36	Software Engineering N A50518	2	2	2	2	2				3		2	2	2.12
37	Compiler Design 50514	2	2	2	2	2	1	1	1	1	1	1	2	1.5
38	Operating System A50510	2	2	1	3								2	2.0
39	Computer Networks A50515	3	3	2	3	3							1	2.5
40	Operating System Lab A50589	1	1	1	1	2					1	1	1	1.12
41	Compiler Design lab A50587	3	3	1	3	3					1	1	2	2.12
	VI Semester (III/II)													
42	Distributed Systems A60521	2	2										1	1.66
43	Information Security A60522	2	2	1	3	3					1		2	2.00
44	Object Oriented Analysis And Design A60524	1	2	1	2	3				1		3	2	1.87
45	Software Testing Methodologies A60525	2	2	1	2	3							2	2.00
46	Managerial Economics And Financial Analysis A60010	2	2	1	3	3							2	2.16
47	Web Technologies A60512	2	2	2	3	3						2	2	2.28
48	CASE Tools and Web Technologies Lab	1	2	2	2	2					3	3	2	2.25

	A60591													
49	Advanced Communication Skills Lab A60086	1	1		1					1	2		2	1.16
VII Semester (IV/I)														
50	Datamining And Datawarehousing A70520	2	2	2	2	3						1	3	2.1
51	Cloud Computing A70519	2	2	2	3	3						2	3	2.42
52	Computer Forensics A70528	2	3	2	2	3						2	3	2.57
53	Computer Graphics A70529	3	2	2	3	3							2	2.14
54	Design Patterns A70530	2	2	2	3	2						2	2	2.14
55	Datawarehousing And Datamining Lab A70595	2	2	2	2	3							3	2.33
56	Linux Programming A70517	2	2	2	3	2							3	2.33
57	Linux Programming Lab A70596	1	2	3	2	1					3	3	3	
VIII Semester (IV/II)														
58	Management Science A80014	2	2	3	2	3	2		0		2	2	1	2.25
59	Storage Area Networks A80550	1	1	2	2	3						3	3	2.14
60	Web Services A80551	2	2	2	1	3							2	2.00
61	Seminar A80089	3	1	2	1	2	1	1					2	1.62
62	Mini Project A80087	2	3	2	3	3			2	3	2	3	3	2.6
63	Project Work-A80088	2	2	2	2	2	2	2	1	1	1	2	3	1.88
64	Comprehensive Viva-A80090	3	3	2	3	3	1	2	1		1	2	3	2.18

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CO-PO mapping for A Y : 2013-2017

S. No	Course code/ Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average programme Outcomes (max 3.00)
	I Year (Annual System)													
1	English A10001		**1**		**1**						3			1.25
2	Mathematics I A10002	1	1	1	1	1								1
3	Mathematical Methods A10003	3	3	2	2	1								2.2
4	Engineering Physics A10004	3	2	1	1	1								1.6
5	Engineering Chemistry A10005	1	1	1		1								1
6	Computer Programming A10501	2	3	1	1	1							1	1.5
7	Engineering Drawing A10301	2	1	1	1	1								1.2
8	Computer Programming lab A10581	3	3	1	1	1							1	1.66
9	Engineering chemistry and physics lab A10081	2	1	1	1	1								1.2
10	Engineering/IT workshop A10082	2	1	1	1	3								1.6
11	English Language Communication skills Lab A10083		1								3			2
	III Semester (II/I)													
12	Probability And	3	2	1	1								2	1.8

	Statistics A30008													
13	Mathematical Foundations Of Computer Science A30504	3	2	1	3			1					3	2.16
14	Data Structures A30502	2	2	2	2	2							3	2.16
15	Digital Logic Design A30401	3	2	2	2			1						2.5
16	Basic Electrical Engineering A30202	3	3	1	2	1								2
17	Electronic Devices and Circuits-A30404	2	1	1	1	1								1.2
18	A30282 Electrical and electronics lab	1	1	1	1	1								1
19	Data Structures lab-A30582	2	1	1	1	2							1	1.3
	IV Semester (II/II)													
20	Computer Organization A40506	2	1	1	1	1							1	1.3
21	Database Management Systems A40507	2	2	2	2	2							1	1.83
22	JAVA Programming A40503	2	2	1	2	2						2	3	2
23	Formal Language And Automata Theory A40509	3	3	1	3								1	2.2
24	Design And Analysis Of Algorithms A40508	1	2	1	2						2	2	2	1.71
25	Environmental Studies-A40009	1	1	1	1	1								1
26	JAVA Programming LAB-A40585	3	3	1	1	1							1	1.66
27	Database Management Systems LAB-A40584	2	1	2	2	2							3	2
	V SEMESTER(III/I)													
28	Principles Of Programming Language A50511	2	2	1	1								1	1.1
29	Disaster Management	1		2	1		1		2	1			2	1.42

	A50117													
30	Software Engineering A50518	2	2	2	2	1				3		1	2	1.87
31	Compiler Design A50514	2	2	2	2	2	1	1	1	1	1	1	2	1.5
32	Operating System A50510	2	2	1	3								2	2
33	Computer Networks A50515	3	3	2	3	3							1	2.5
34	Operating System Lab A50589	1	1	1	1	2					1	1	1	1.12
35	Compiler Design lab A50587	2	2	1	3	3					1	1	2	1.87
	VI SEMESTER(III/II)													
36	Distributed Systems A60521	2	2											2
37	Information Security A60522	2	2	1	3	3					1		2	2
38	Object Oriented Analysis And Design A60524	1	2	1	2	3				1		3	2	1.87
39	Software Testing Methodologies A60525	2	2	1	2	3							2	1.83
40	Managerial Economics And Financial Analysis A60010	2	2	1	3	3							2	2.16
41	Web Technologies A60512	2	2	2	3	3							2	2.33
42	CASE Tools and Web Technologies Lab A60591	1	2	2	2	2					3	3	3	2.25
43	Advanced Communication Skills Lab A60086	1	1		1					1	2		2	1.33
	VII Semester (IV /I)													
44	Linux Programming 57046	2	2	2	2	2							2	2
45	Computer forensics 57611	1	2	2	2	2						1	2	1.71
46	Data Warehousing And Data Mining 57048	2	2	2	2	2							3	2.16

47	Cloud Computing 57051	2	1	2	2	2					1	1	3	1.75
48	Computer Graphics 57049	2	2	1	2	2							2	1.83
49	Design Patterns 57054	2	2	1	3	2						2	2	2
50	Linux Programming lab 57609	1	2	2	2	2					3	3	3	2.25
51	Data Warehousing And Data Mining lab 57610	2	1	3	3	3							3	2.5
	VIII Semester (IV/II)													
52	Management Science 58007	2	2	1	1				1	1		2	2	1.5
53	Storage Area Networks 58040	2	2	1	2								2	1.5
54	Web services 58035	1	2	1	1	3							1	1.5
55	Seminar-58618	3	1	2	1	2	1	1					2	1.62
56	Industry oriented mini project 58617	2	3	2	3	3			2	3	2	3	3	2.6
57	Project work 58619	2	3	2	3	3			2	3	2	3	3	2.6
58	Comprehensive viva 58620	3	3	2	3	3		2			1	2	3	2.44

CO-PO mapping 2012-2016

S. No	Course code/ Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average programme Outcomes (max 3.00)
	I Year (Annual System)													
1	English	0	1		1						3			1.25

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2	Mathemetics-I	1	1	1	1	1								1
3	Mathematical Methods	1	1	1	1	1								1
4	Engineering Physics	3	2	1	1	1								1.6
5	Engineering Chemistry	1	1	1		1								1
6	Computer Programming through data structures	2	3	1	1	1							1	1.5
7	Engineering Drawing	2	1	1	1	1								1.2
8	Computer Programming lab	3	3	1	1	1							1	1.66
9	Engineering Physics and Engineering Chemistry Lab	2	1	1	1	1								1.2
10	English Language Communication skills Lab		1								3			2
11	IT Workshop/Engineering workshop	2	1	1	1	3								1.6
	III Semester (II/I)													
12	Probability And Statistics A30008	3	2	1	1									1.75
13	Mathematical Foundations Of Computer Science A30504	3	2	1	3			1					3	2.16
14	Data Structures through C++ A30502	2	2	2	2	2							3	2.16
15	Digital Logic Design A30401	3	2	2	2			1						2
16	Basic Electrical Engineering A30202	3	3	1	2	1								2
17	Electronic Devices and Circuits-A30404	2	1	1	1	1								1.2
18	A30282 Electrical and electronics lab	1	1	1	1	1								1
19	Data Structures lab-A30582	2	2	2	2	2							3	2.16
	IV Semester (II/II)													
20	Computer Organization A40506	2	1	1	1								1	1
21	Database Management	2	2	2	2	2							1	1.83

	Systems A40507													
22	Object oriented Programming A40503	2	2	1	2	2						2	3	2
23	Formal Language And Automata Theory A40509	3	3	1	3								1	2.2
24	Design And Analysis Of Algorithms A40508	1	2	1	2						2	2	2	1.7
25	Environmental Studies A40009	1	1	1	1	1								1
26	Object oriented Programming Programming LAB A40585	3	3	1	1	1							1	1.66
27	Database Management Systems LAB A40584	2	1	2	2	2							3	2
	V SEMESTER(III/I)													
28	Principles Of Programming Language 55025	2	2	1	1								1	1.4
29	Computer forensics 55028	2	2	2	2	2	1	1	1	1	1	1	2	1.5
30	Software Engineering 55029	2	2	2	2	2				3		2	2	2
31	Micro processing Interface 55030	3	3	1	2	1								2
32	Operating System 55031	2	2	1	3								2	2
33	Data communication Computer Networks 55032	3	3	2	3	3							1	2.5
34	Computer network and Operating system Lab 55609	2	2	2	2	2							3	2.16
35	Micro processing Interface LAB 55608	1	1	1	1	1								1
	VI SEMESTER(III/II)													
36	Network security 56030	2	2	1	3	3							2	2

37	Compiler Design 56031	2	2	1	3	3					1		2	2
38	Object Oriented Analysis And Design 56028	1	2	1	2	3				1		3	2	1.87
39	VLSI 56029	2	2	1	3	3							2	2.16
40	Managerial Economics And Financial Analysis 56023	2	2	1	3	3							2	2.16
41	Web Technologies 56032	2	2	2	3	3						2	2	2.28
42	WebTechnologies and compiler Design LAB 56610	1	2	2	2	2						3	3	2.14
43	Advanced Communication Skills Lab 56609	1	1		1					1	2		2	1.33
	VII Semester (IV /I)													
44	Linux Programming 57046	2	2	2	2	2							2	2
45	Software Testing Methodologies-57047	1	1	2	2	2						1	3	1.57
46	Data Warehousing And Data Mining 57048	1	1	2	2	2	2	1	1	3	3	3	3	2
47	Cloud Computing 57051	2	1	2	2	2					1	1	3	1.75
48	Computer Graphics 57049	3	2	1	3	3							2	2.33
49	Design Patterns 57054	2	2	1	3	2						2	2	2
50	Linux Programming Data Warehousing And Data Mining lab-57609	1		2	2	2					3	3	3	2.28
51	CASE Tools and Software Testing Methodologies lab 57610	2		2	2	2						1	3	2
	VIII Semester (IV/II)													
52	Management Science 58007	1		1	1	1					1	1	1	1

53	Storage Area Networks 58040	1		1	1	1					1	1	1	1
54	Web services 58035	1	2	1	1	3							1	1.5
55	Seminar 58618	3	1	2	1	2	1	1					2	1.62
56	Industry oriented mini project 58617	2	3	2	3	3			2	3	2	3	3	2.6
57	Project work 58619	2	3	2	3	3			2	3	2	3	3	2.6
58	Comprehensive viva 58620	3	3	2	3	3	1	2	1		1	2	3	2.18

CO-PSO mapping 2014-2018

S. No	Course code/ Course title	PS01	PSO2	Average programme outcomes (max 3.00)
	I Semester (I/I)			
1	English A10001			
2	Mathematics-I A10002			
3	Mathematical Methods A10003			
4	Engineering Physics A10004			
5	Engineering Chemistry A10005			
6	Computer Programming A10501	3	3	3
7	Engineering Drawing A10301			
8	Computer Programming lab A10581	2	2	2
9	Engineering chemistry and physics lab A10081	2	2	
10	Engineering/IT workshop A10082	2	2	2
11	English Language Communication skills Lab A10083	2	2	2

	II-I			
17	probability And Statistics A30008	`1	1	1
18	Mathematical Foundations Of Computer Science A30504	2	1	1.5
19	Data Structures A30502	2	1	1.5
20	Digital Logic Design A30401	1		1
21	Basic Electrical Engineering A30202	2	2	2
22	Electronic Devices and Circuits -A30404	2	1	1.5
23	Electrical and electronics lab A30282			
24	Data Structures lab- A30582	2	1	1.5
	IV Semester (II/II)			
25	Computer Organization A40506	1	1	1
26	Database Management Systems A40507	1	2	1.5
28	JAVA Programming A40503	1	2	1.5
29	Formal Language And Automata Theory A40509	2	1	1.5
30	Design And Analysis Of Algorithms A40508	2	1	1.5
31	Environmental Studies A40009			
32	JAVA Programming LAB A40585	2	2	2
33	Database Management Systems LAB A40584	3	3	3
	V Semester (III/I)			
34	Principles Of Programming Language A50511	1	1	1
35	Disaster Management A50117	1	1	1
36	Software Engineering N A50518	2	2	2
37	Compiler Design 50514	2	2	2
38	Operating System	2	1	1.5

	A50510			
39	Computer Networks A50515	2	1	1.5
40	Operating System Lab A50589	2	1	1.5
41	Compiler Design lab A50587	2	3	2.5
	VI Semester (III/II)			
42	Distributed Systems A60521	3	2	2.5
43	Information Security A60522	2	2	2
44	Object Oriented Analysis And Design A60524	1	3	1.5
45	Software Testing Methodologies A60525	2	2	2
46	Managerial Economics And Financial Analysis A60010	2	2	2
47	Web Technologies A60512	2	2	2
48	CASE Tools and Web Technologies Lab A60591	2	1	1.5
49	Advanced Communication Skills Lab A60086		1	1
	VII Semester (IV/I)			
50	Datamining And Datawarehousing A70520	3	3	3
51	Cloud Computing A70519	3	2	2.5
52	Computer Forensics A70528	3	3	3
53	Computer Graphics A70529	2	2	2
54	Design Patterns A70530	2	2	2
55	Datawarehousing And Datamining Lab A70595	3	3	3
56	Linux Programming A70517	3	3	3
57	Linux Programming Lab A70596	3	3	3
	VIII Semester (IV/II)			
58	Management Science A80014	1 0	1	1 2
59	Storage Area Networks	3	2	2.5

	A80550			
60	Web Services A80551	2	2	2
61	Seminar A80089	2	2	2
62	Mini Project A80087	2	2	2
63	Project Work- A80088	3	2	2.5
64	Comprehensive Viva- A80090	3	3	3

CO-PSO mapping 2013-2017

S. No	Course code/ Course title	PO1	PO2	Average programme outcomes (max 3.00)
1	English A10001			
2	Mathematics I A10002	1	1	1
3	Mathematical Methods A10003			
4	Engineering Physics A10004			
5	Engineering Chemistry A10005			
6	Computer Programming A10501	3	3	3
7	Engineering Drawing A10301			
8	Computer Programming lab A10581	2	2	2
9	Engineering chemistry and physics lab A10081			
10	Engineering/IT workshop A10082			
11	English Language Communication skills Lab			

	A10083			
		II-1		
12	Probability And Statistics A30008	1	1	1
13	Mathematical Foundations Of Computer Science A30504	2	1	1.5
14	Data Structures A30502	2	2	2
15	Digital Logic Design A30401	1		1
16	Basic Electrical Engineering A30202			
17	Electronic Devices and Circuits-A30404			
18	A30282 Electrical and electronics lab			
19	Data Structures lab-A30582	2	1	1.5
		II-II		
20	Computer Organization A40506	1	1	1
21	Database Management Systems A40507	2	2	2
22	JAVA Programming A40503	1	2	1.5
23	Formal Language And Automata Theory A40509	2	1	1.5
24	Design And Analysis Of Algorithms A40508	1	1	1
25	Environmental Studies-A40009			
26	JAVA Programming LAB-A40585	2	2	2
27	Database Management Systems LAB-A40584	3	3	3
		III-I		
28	Principles Of Programming Language A50511	1	1	1
29	Disaster Management A50117	1	1	1
30	Software Engineering A50518	2	1	1.5
31	Compiler Design	2	2	2

	A50514			
32	Operating System A50510	2	1	1.5
33	Computer Networks A50515	2	1	1.5
34	Operating System Lab A50589	2	1	1.5
35	Compiler Design lab A50587	2	3	2.5
	III-II			
36	Distributed Systems A60521	3	2	2.5
37	Information Security A60522	2	2	2
38	Object Oriented Analysis And Design A60524	1	3	2
39	Software Testing Methodologies A60525	2	2	2
40	Managerial Economics And Financial Analysis A60010	2	2	2
41	Web Technologies A60512	2	2	2
42	CASE Tools and Web Technologies Lab A60591	2	1	1.5
43	Advanced Communication Skills Lab A60086		1	1
	IV-I			
44	Linux Programming 57046	3	3	3
45	Computer forensics 57611	2	2	2
46	Data Warehousing And Data Mining 57048	3	3	3
47	Cloud Computing 57051	3	2	2.5
48	Computer Graphics 57049	2	2	2
49	Design Patterns 57054	2	2	2

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50	Linux Programming lab 57609	3	3	3
51	Data Warehousing And Data Mining lab 57610	3	3	3
	IV-II			
52	Management Science 58007	2	2	2
53	Storage Area Networks 58040	2	2	2
54	Web services 58035	2	2	2
55	Seminar-58618	2	2	2
56	Industry oriented mini project 58617	2	2	2
57	Project work 58619	2	2	2
58	Comprehensive viva 58620	3	3	3

2012-2016

S. No	Course code/ Course title	PSO1	PSO2	Average programme outcomes (max 3.00)
	I			
1	English			
2	Mathemetics-I	1	1	1
3	Mathematical Methods	1	1	1
4	Engineering Physics			
5	Engineering Chemistry			
6	Computer Programming	3	3	3
7	Engineering Drawing			
8	Computer Programming lab	2	2	2
9	Engineering Physics and Engineering Chemistry Lab			
10	English Language Communication skills Lab			
11	IT Workshop/Engineering workshop			
	II-I			
12	Probability And Statistics	1	1	1

	A30008			
13	Mathematical Foundations Of Computer Science A30504	2	1	1.5
14	Data Structures through C++ A30502	2	2	2
15	Digital Logic Design A30401	1		1
16	Basic Electrical Engineering A30202			
17	Electronic Devices and Circuits-A30404			
18	A30282 Electrical and electronics lab			
19	Data Structures lab-A30582	3	2	2.5
	II-II			
20	Computer Organization A40506	1		1
21	Database Management Systems A40507	2	2	2
22	Object oriented Programming A40503	1	2	1.5
23	Formal Language And Automata Theory A40509	2	1	1.5
24	Design And Analysis Of Algorithms A40508	1		1
25	Environmental Studies A40009			
26	Object oriented Programming Programming LAB A40585	2	2	2
27	Database Management Systems LAB A40584	3	3	3
	III-I			
28	Principles Of Programming Language 55025	1	1	1
29	Computer forensics 55028	2	2	2
30	Software Engineering 55029	2	2	2
31	Micro processing Interface 55030			
32	Operating System 55031	2	1	1.5
33	Data communication Computer Networks 55032	2	1	1.5
34	Computer network and Operating system Lab	3	2	2.5

	55609			
35	Micro processing Interface LAB 55608			
	III-II			
36	Network security 56030	2	2	2
37	Compiler Design 56031	2	2	2
38	Object Oriented Analysis And Design 56028	1	3	2
39	VLSI 56029	2	2	2
40	Managerial Economics And Financial Analysis 56023	2	2	2
41	Web Technologies 56032	2	2	2
42	Web Technologies and compiler Design LAB 56610	2	1	1.5
43	Advanced Communication Skills Lab 56609		1	1
	IV-I			
44	Linux Programming 57046	3	3	3
45	Software Testing Methodologies-57047	3	3	3
46	Data Warehousing And Data Mining 57048	3	3	3
47	Cloud Computing 57051	3	2	2.5
48	Computer Graphics 57049	2	2	2
49	Design Patterns 57054	2	2	2
50	Linux Programming Data Warehousing And Data Mining lab-57609	3	3	3
51	CASE Tools and Software Testing Methodologies lab 57610	3	3	3
	IV-II			
52	Management Science 58007	1	1	1
53	Storage Area Networks 58040	1	1	1

54	Web services 58035	2	2	2
55	Seminar 58618	2	2	2
56	Industry oriented mini project 58617	2	2	2
57	Project work 58619	2	2	2
58	Comprehensive viva 58620	3	3	3

Attainment of Course Outcomes

Describe the assessment processes used to gather the data upon which the evaluation of Course Outcome is based

To evaluate the attainment of course outcomes the data is gathered from the following assessments:

a) Performance of the students in the internal (Mid1+Mid2) examinations both theory and laboratory course.

b) Performance of the students in the University examinations for both theory and laboratory course

c) Performance of the students in the Industrial oriented mini project and Project work.

d) Performance of the students in the Seminar and comprehensive viva.

a) Internal Examinations:

Theory:

Two mid examinations are conducted for each course.

The mid examination consists of three parts,

Descriptive paper set by the course faculty/ Team of Instructors which is evaluated for maximum marks of 10; objective paper set by the university is evaluated for maximum marks of 10 and assignments are given by course faculty are evaluated for maximum marks of 5.

For each mid examination, each question of the descriptive part is mapped with a particular CO of the course and there will be at least one question for each of the CO's in either of the mid examinations.

The question wise marks obtained by the students in each mid examination (Descriptive part) and marks obtained in the objective, assignments are used to evaluate the attainment of CO's.

Laboratory: Two mid examinations are conducted for each laboratory course. Each mid examination is evaluated for maximum marks of 25 marks. These marks are distributed among Day to day performance (5 marks), record/observation (5 marks), viva (5 marks) and write up (10 marks).

The marks obtained by the students in each mid examination are used to evaluate the CO attainment.

b) University examinations:

The university examinations are conducted for 75 marks (theory courses) and for 50 marks (laboratory courses).

The marks obtained by the students in each course in the university examinations and also considering the performance of mid examinations, the overall CO attainment level is computed.

c) Project work and industry oriented mini project:

The project work is evaluated for 200 marks out of which 50 marks for internal evaluation and 150 marks for university examinations. The evaluation for internal marks of 50 is based on rubrics formulated for the project work by the project review committee appointed by the head of the department. The evaluation for 150 marks of University exam is based on the assessment by an external examiner appointed by the university.

Industry oriented mini project is evaluated for maximum of 50 marks by the external examiner.

The attainment of CO is evaluated based on the marks obtained in the project work and industry oriented mini project.

d) Seminar and Comprehensive Viva:

The seminar is evaluated for a maximum of 50 marks (internal only) based on the rubrics formulated for the seminar by three member panel appointed by the head of the department.

The attainment of CO is evaluated based on the marks obtained in the seminar and comprehensive viva.

Following are some mid descriptive question paper for selected courses from 2nd to 4th year of the program, below each question of the paper CO to which it is mapped is mentioned

SREYAS INSTITUTE OF ENGINEERING & TECHNOLOGY
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II B.TECH I SEM. (R16) I - Mid EXAMINATIONS –SEP, 2017

Subject: **DATA STRUCTURES THROUGH C++** Branch: CSE
Duration: **1 Hour** Date: 13-9-2017 (AN) Max Marks: **10**
Answer any TWO Questions All Questions Carries Equal Marks

1. a) Demonstrate a Class & Object? Explain with an example.
   [CO1,TL2,1.5 M]
   b) Discuss about Access Specifiers with examples.
   [CO1, TL2,2 M]
   c) Design Friend Function with an example.
   [CO1, TL5,1.5 M]
2. a) List different operations on Singly Linked List.
   [CO2,TL1,3 M]
   b) Distinguish between Triplet & Linked Representation of Sparse matrix with examples.
   [CO2,TL2,2 M]
3. a) Categorize terms Node, Degree, Siblings, Depth, Height, Path and level in Treeterminology.
   [CO3,TL5,3M]
   b) Explain Binary Tree ADT. Discuss representation of Binary Tree
   [**CO3,TL2,2 M]**
4. a) Compare the role of Space Complexity and Time Complexity in measuring the performance of a program?**[CO1,TL6,3M]**
   b) Compute the following Postfix Expression using Stack. 53+82-***[CO1, TL3,2 M]**

SREYAS INSTITUTE OF ENGINEERING & TECHNOLOGY
Nagole, Hyderabad- 500 068.
II B.Tech II Sem. (R16) I- Mid Examinations - January, 2017

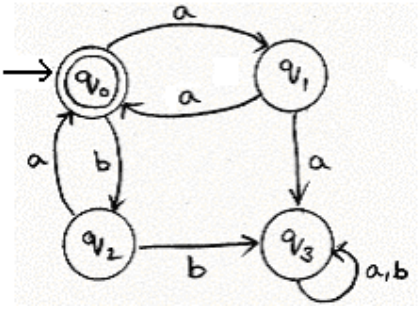
Subject: Formal Languages and Automata Theory — Branch: CSE
Duration: 1 Hour — Date: 02-2-2017 — Max Marks: 10
Answer any TWO Questions — All Questions Carries Equal Marks

1. a) Design DFA accepting the set of all strings with three consecutive 0's over the alphabet { 0, 1}
[CO-1, TL-5, Marks 2.5]
b) Design DFA equivalent to the NFA M = ({p,q,r,s},{0,1}, δ ,P, {s}) and δ is given by
[CO-1, TL-5, Marks 2.5]

δ	0	1
p	{p,q}	{p}
q	{r}	{r}
r	s	-
s	s	s

2. a) Given the regular expression (11+0)*. Convert into NFA with ε transition Diagram
[CO-2, TL-2, Marks 2.5]

b) Generate regular expression for the language accepted by following finite automaton.
[CO-2, TL-5, Marks 2.5]



3. a) LetGbethegrammarS→aB|bA, [CO-3, TL-5, Marks 2.5]
A→a|aS|bAA,
B→b|bS|Abb forthe string aaabbabbba generate
(i) Leftmostderivation Tree (ii)Right Most Derivation Tree

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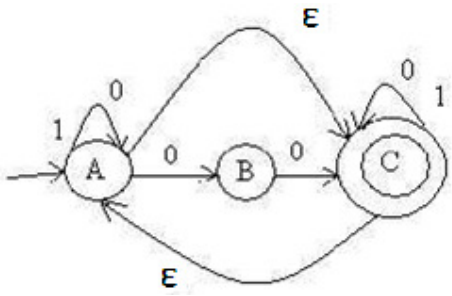
b) Show that grammar is ambiguous [CO-3, TL-3, Marks 2.5]

S→aSbS|bSaS| ε

4. a) Design NFA for the given NFA with ε-moves. [CO-1, TL-5, Marks 2.5]



b)Explain Applications Of Regular Expressions? [CO-2, TL-2, Marks 2.5]

3.2.2 Record the attainment of Course Outcomes of all courses with respect to set attainment Levels

The following methodology is followed for evaluating the attainment of Course Outcomes for each academic year.

a) Theory course:
Mid examination:

Marks obtained by the students in the mid examination are entered in excel spreadsheet.

Descriptive part:

Question wise marks are entered in the excel sheet. Based on the percentage of students scoring more than the threshold value, attainment for CO is obtained by following the set attainment levels. Attainment levels set for descriptive as follows:

Attainment Level 1: 40% to 50% of students scoring more than 60% of marks out of the maximum marks.

Attainment Level 2: 50% to 60% of students scoring more than 60% of marks out of the maximum marks.

Attainment Level 3: 60% and above students scoring more than 60% of marks out of the maximum marks.

Maximum mark for each question in descriptive part is 5. Hence, the threshold value is 3 (i.e. 60% of 5).

Objective and Assignment parts:

Marks of objective, assignment are entered in the respective columns in the excel sheet. Based on the percentage of students scoring more than the threshold value, attainment for CO is obtained by following the set attainment levels. Attainment levels set for objective and assignment is same as the descriptive part.

Maximum mark for objective part is 10. Hence, the threshold value is 6 (i.e. 60% of 10) for objective. Maximum mark for assignment part is 5. Hence, the threshold value is 3 (i.e. 60% of 5) for assignment.

An average of CO attainments obtained through the three parts of the mid is calculated for each course outcome and further an average of these averages is calculated to obtain CO attainment through mid examination.

University examination:

As the mapping of questions to COs is not available for the university examinations, the attainment level of all the COs is taken as same based on the following levels.

Attainment Level 1: 40% to 50% of students scoring more than 40% of marks out of the maximum marks.

Attainment Level 2: 50% to 60% of students scoring more than 40% of marks out of the maximum marks.

Attainment Level 3: 60% and above students scoring more than 40% of marks out of the maximum marks.

Maximum mark for university examination (theory) is 75. Hence, the threshold value is 30 (i.e. 40% of 75).

Calculation of overall attainment of course outcomes for theory courses:

The weightage given for mid examination is 25% and for university examination is 75%.

Overall attainment of CO = (25% of CO attainment through mid examination) + (75% of CO attainment through university examination).

Example: Object oriented programming through Java for academic year 2014-2018.

CO attainment through mid examination

CO	ATTAINMENT CO WISE									
	Desc	Attain	Obj	Attain	Assig	Attain	Int Att	Ext Att	Overall	
CO 1	32.53	0	18.49	0	100.00	3	0.6	3	2.4	
CO 2	45.65	1	18.49	0	100.00	3	1	3	2.5	
CO 3	30.45	0	26.53	0	100.00	3	0.6	3	2.4	
CO 4	37.65	0	34.57	0	100.00	3	0.6	3	2.4	
CO 5	8.85	0	34.57	0	100.00	3	0.6	3	2.4	

CO attainment through university examination:
83% of students have scored more than the threshold, hence the attainment level is 3.
Overall CO attainment level:

Overall attainment = (25% of CO attainment through mid examination) + (75% of CO attainment through university examination)
Thus**, overall CO attainment level** for Data Structures through C++ (2017-2018) = (0.75*3)+(0.25*3) = 3

b) Laboratory course:

Mid examination:
Based on the following levels CO attainment is obtained. Threshold value is 17.5 (i.e. 60% of 25).

Attainment Level 0: Less than 50% of students scoring more than 60% of marks out of the maximum marks.

Attainment Level 1: 50% to 60% of students scoring more than 60% of marks out of the maximum marks.

Attainment Level 2: 60% to 70% of students scoring more than 60% of marks out of the maximum marks.

Attainment Level 3: 70% and above students scoring more than 60% of marks out of the maximum mark.

University examination:
Based on the following levels CO attainment is obtained. Threshold value is 30 (i.e. 40% of 50).

Attainment Level 0: Less than 40% of students scoring more than 60% of marks out of the maximum marks

Attainment Level 1: 40% to 50% of students scoring more than 60% of marks out of the maximum marks.

Attainment Level 2: 50% to 60% of students scoring more than 60% of marks out of the maximum marks.

Attainment Level 3: 60% and above students scoring more than 60% of marks out of the maximum mark.

Calculation of overall attainment of course outcomes for laboratory course is same as the theory courses.

c) Project work:

Based on the following levels CO attainment is obtained. Threshold value is 90 (i.e. 60% of 150) for university assessment.

Attainment Level 0: Less than 50% of students scoring more than 60% of marks out of the maximum marks

Attainment Level 1: 50% to 60% of students scoring more than 60% of marks out of the maximum marks.
Attainment Level 2: 60% to 70% of students scoring more than 60% of marks out of the maximum marks.

Attainment Level 3: 70% and above students scoring more than 60% of marks out of the maximum mark.

Calculation of overall attainment of course outcomes for project is same as the theory & laboratory courses.

d) Industry oriented mini project, seminar and comprehensive viva:

Attainment levels followed for industry oriented mini project, seminar and comprehensive viva is same as that of project work. Threshold value for mini project is 30 (i.e. 60% of 50), seminar is 30 and for comprehensive viva is 60 (i.e. 60% of 100).

e) Industry oriented mini project, seminar and comprehensive viva:

Attainment levels followed for industry oriented mini project, seminar and comprehensive viva is same as that of project work. Threshhold value for mini project is 30 (i.e. 60% of 50), seminar is 30 and for comprehensive viva is 60 (i.e. 60% of 100).

Following are the tables showing the attainment levels obtained for mid and university examination and also overall course outcome for each course in the program for all the three academic years:
2014-2018

S. No	Course code/ Course title	CO1	CO2	CO3	CO 4	CO5
	I Semester (I/I)					
1	English A10001	2.70	2.80	2.60	3.00	2.8
2	Mathematics-I A10002	1.20	1.30	1.10	1.50	1.4
3	Mathematical Methods A10003	1.20	1.10	1.10	1.30	1.4
4	Engineering Physics A10004	1.30	1.10	1.10	1.50	1.5
5	Engineering Chemistry A10005	1.20	1.30	1.10	1.50	1.3
6	Computer Programming A10501	1.10	1.20	1.20	1.40	1.4
7	Engineering Drawing A10301	0.00	1.20	1.20	0.00	1.4
8	Computer Programming lab A10581	3.00	3.00	3.00	3.00	3.00
9	Engineering chemistry and physics lab A10081	3.00	3.00	3.00	3.00	3.00
10	Engineering/IT workshop A10082	3.00	3.00	3.00	3.00	3.00
11	English Language Communication skills Lab A10083	3.00	3.00	3.00	3.00	3.00
	II-1					
17	probability And Statistics A30008	0.60	1.80	0.60	1.00	0.25
18	Mathematical Foundations Of Computer Science A30504	2.60	2.60	1.80	1.80	2.20
19	Data Structures A30502	2.20	2.20	1.40	0.60	0.60
20	Digital Logic Design A30401	2.60	2.60	3.00	1.80	1.80

21	Basic Electrical Engineering A30202	2.20	2.60	1.80	1.80	1.80
22	Electronic Devices and Circuits -A30404	2.60	2.60	1.80	1.80	2.20
23	Electrical and electronics lab A30282	3.00	3.00	3.00	3.00	3.00
24	Data Structures lab- A30582	3.00	3.00	3.00	3.00	3.00
	IV Semester (II/II)					
25	Computer Organization A40506	3.00	3.00	3.00	1.80	1.80
26	Database Management Systems A40507	1.80	1.80	1.80	0.60	0.60
28	JAVA Programming A40503	1.80	1.80	1.80	0.60	0.60
29	Formal Language And Automata Theory A40509	2.60	1.80	1.00	0.60	1.40
30	Design And Analysis Of Algorithms A40508	2.60	2.60	1.00	0.60	0.60
31	Environmental Studies A40009	1.80	1.80	1.80	1.40	0.60
32	JAVA Programming LAB A40585	3.00	3.00	3.00	3.00	3.00
33	Database Management Systems LAB A40584	1.80	1.80	1.80	0.60	0.60
	V Semester (III/I)					
34	Principles Of Programming Language A50511	1.40	1.40	1.00	1.80	3.00
35	Disaster Management A50117	3.00	3.00	3.00	3.00	3.00
36	Software Engineering N A50518	2.33	2.33	2.33	2.33	2.33
37	Compiler Design 50514	2.20	2.20	1.80	1.40	1.40
38	Operating System A50510	3.00	3.00	2.00	2.67	2.00
39	Computer Networks A50515	3.00	3.00	3.00	3.00	3.00
40	Operating System Lab A50589	3.00	3.00	3.00	3.00	3.00
41	Compiler Design lab A50587	3.00	3.00	3.00	3.00	3.00
VI Semester (III/II)						
42	Distributed Systems	2.20	2.20	1.80	1.40	1.40

	A60521					
43	Information Security A60522	2.20	2.20	1.80	1.40	1.40
44	Object Oriented Analysis And Design A60524	2.20	2.20	1.80	1.40	1.40
45	Software Testing Methodologies A60525	2.20	2.20	1.80	1.40	1.40
46	Managerial Economics And Financial Analysis A60010	2.20	2.20	1.80	1.40	1.40
47	Web Technologies A60512	2.20	2.20	1.80	1.40	1.40
48	CASE Tools and Web Technologies Lab A60591	3.00	3.00	3.00	3.00	3.00
49	Advanced Communication Skills Lab A60086	3.00	3.00	3.00	3.00	3.00
	VII Semester (IV/I)					
50	Data mining And Data warehousing A70520	2.00	1.96	1.95	2.12	2.22
51	Cloud Computing A70519	1.76	1.96	1.95	2.04	2.14
52	Computer Forensics A70528	2.75	2.72	2.87	2.80	2.90
53	Computer Graphics A70529	2.60	2.56	2.72	2.80	2.90
54	Design Patterns A70530	2.22	2.20	2.36	2.20	2.28
55	Data warehousing And Data mining Lab A70595	2.84	2.80	2.95	2.80	2.90
56	Linux Programming A70517	2.68	2.64	2.79	2.80	2.90
57	Linux Programming Lab A70596	1.01	1.00	1.16	1.00	1.08
	VIII Semester (IV/II)					
58	Management Science A80014	1.040	1.00 2	1.15	1.00 2	1.10 3 0
59	Storage Area Networks A80550	2.14	2.12	2.28	2.20	2.28
60	Web Services A80551	1.51	1.52	1.67	1.60	1.68
61	Seminar A80089	3	3	3	3	3
62	Mini Project A80087	3	1.5	3	3	3
63	Project Work- A80088	3	3	3	3	3

64	Comprehensive Viva- A80090	3	3	3	3	3

2013-2017

S. No	Course code/ Course title	CO1	CO2	CO3	CO4	CO5
	I					
1	English A10001	1.85	2.15	2.15	1.95	2.05
2	Mathematics I A10002	0.75	0.45	0.35	0.35	0.55
3	Mathematical Methods A10003	0.55	0.55	0.55	0.25	0.45
4	Engineering Physics A10004	0.45	0.75	0.35	0.25	0.25
5	Engineering Chemistry A10005	1.20	1.20	1.20	1.10	1.10
6	Computer Programming A10501	1.95	1.65	1.65	1.75	1.95
7	Engineering Drawing A10301	0.75	0.75	0.75	0.75	0.75
8	Computer Programming lab A10581	3.00	3.00	3.00	3.00	3.00
9	Engineering chemistry and physics lab A10081	3.00	3.00	3.00	3.00	3.00
10	Engineering/IT workshop A10082	3.00	3.00	3.00	3.00	3.00
11	English Language Communication skills Lab A10083	3.00	3.00	3.00	3.00	3.00
II-I						
12	Probability And Statistics A30008	1.80	1.80	1.00	1.40	0.60
13	Mathematical Foundations Of Computer Science A30504	1.80	1.80	1.00	0.60	1.00
14	Data Structures A30502	1.80	1.80	0.60	0.60	0.60
15	Digital Logic Design A30401	2.60	2.60	2.60	1.80	1.40
16	Basic Electrical Engineering A30202	1.80	1.80	1.40	0.60	0.60
17	Electronic Devices and Circuits-A30404	1.80	1.80	0.60	1.80	0.60
18	A30282 Electrical and electronics lab	3.00	3.00	3.00	3.00	3.00
19	Data Structures lab-A30582	3.00	3.00	3.00	3.00	3.00

			II-II			
20	Computer Organization A40506	3.00	3.00	1.40	1.00	1.40
21	Database Management Systems A40507	2.20	2.20	1.80	1.80	3.00
22	JAVA Programming A40503	1.40	0.60	1.80	0.60	1.00
23	Formal Language And Automata Theory A40509	2.60	2.60	2.20	1.80	1.40
24	Design And Analysis Of Algorithms A40508	1.40	1.80	0.60	1.80	0.60
25	Environmental Studies-A40009	2.60	2.60	2.20	1.80	0.60
26	JAVA Programming LAB-A40585	3	3	3	3	3
27	Database Management Systems LAB-A40584	3.00	3.00	3.00	3.00	3.00
			III-I			
28	Principles Of Programming Language A50511	0.60	1.00	1.80	1.00	1.00
29	Disaster Management A50117	3.00	3.00	3.00	3.00	3.00
30	Software Engineering A50518	2.60	1.40	2.60	1.80	2.20
31	Compiler Design A50514	1.40	1.00	0.60	1.40	0.60
32	Operating System A50510	2.00	2.00	1.33	1.67	1.67
33	Computer Networks A50515	2.33	2.33	3.00	2.67	3.00
34	Operating System Lab A50589	3	3	3	3	3
35	Compiler Design lab A50587	3.00	3.00	3.00	3.00	3.00
			III-II			
36	Distributed Systems A60521	3.00	3.00	2.20	1.80	1.80
37	Information Security A60522	1.80	2.20	1.80	2.20	1.80
38	Object Oriented Analysis And Design A60524	2.60	3.00	3.00	1.80	1.80
39	Software Testing Methodologies A60525	2.60	2.60	3.00	1.80	2.20
40	Managerial Economics And Financial Analysis A60010	3.00	3.00	3.00	3.00	1.80
41	Web Technologies A60512	2.60	2.60	1.80	1.80	2.20

A.Suresh
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9-39, Sy.No: 107, Tattiannaram (V),
GSI, Bandlaguda, Nagole, Hyd-68.

42	CASE Tools and Web Technologies Lab A60591	3	3	3	3	3
43	Advanced Communication Skills Lab A60086	3	3	3	3	3
	IV-I					
44	Linux Programming 57046	3.00	3.00	3.00	2.60	1.80
45	Computer forensics 57611	1.80	1.80	0.60	0.60	1.40
46	Data Warehousing And Data Mining 57048	3.00	3.00	3.00	1.80	1.80
47	Cloud Computing 57051	3.00	3.00	1.80	1.40	2.60
48	Computer Graphics 57049	1.80	1.80	0.60	0.60	1.40
49	Design Patterns 57054	2.60	3.00	3.00	3.00	1.80
50	Linux Programming lab 57609	3	3	3	3	3
51	Data Warehousing And Data Mining lab 57610	3	3	3	3	3
	IV-II					
52	Management Science 58007	3.00	3.00	1.80	3.00	2.20
53	Storage Area Networks 58040	2.20	2.20	0.60	1.00	0.60
54	Web services 58035	3.00	3.00	1.80	2.60	1.40
55	Seminar-58618	3	3	3	3	3
56	Industry oriented mini project 58617	3	1.50	3	1.50	3
57	Project work 58619	3	3	3	3	3
58	Comprehensive viva 58620	3	3	3	3	3

2012-2016

S. No	Course code/ Course title	CO1	CO2	CO3	CO4	CO5
	I					
1	English	2.50	2.80	2.70	2.40	2.50
2	Mathematics-I	1.10	1.30	1.00	0.90	0.90
3	Mathematical Methods	2.70	2.70	2.70	2.40	2.70
4	Engineering Physics	1.20	1.20	0.90	1.00	0.90
5	Engineering Chemistry	0.45	0.45	0.35	0.15	0.15
6	Computer Programming and data structures	1.95	1.65	1.65	1.75	1.75
7	Engineering Drawing	3.00	3.00	3.00	3.00	3.00
8	Computer Programming lab	3.00	3.00	3.00	3.00	3.00
9	Engineering Physics and Engineering Chemistry Lab	3.00	3.00	3.00	3.00	3.00
10	English Language Communication skills Lab	3.00	3.00	3.00	3.00	3.00
11	IT Workshop/Engineering workshop	3.00	3.00	3.00	3.00	3.00
	II-I					
12	Probability And Statistics A30008	1.80	1.80	0.60	1.80	1.80
13	Mathematical Foundations Of Computer Science A30504	2.60	2.60	1.40	1.40	2.60
14	Data Structures through C++ A30502	1.80	1.80	1.00	1.80	3.00
15	Digital Logic Design A30401	1.80	1.80	0.60	1.00	0.60
16	Basic Electrical Engineering A30202	1.80	1.40	0.60	1.40	1.00
17	Electronic Devices and Circuits-A30404	2.60	2.60	1.00	2.20	1.00
18	A30282 Electrical and electronics lab	3.00	3.00	3.00	3.00	3.00
19	Data Structures lab-A30582	3.00	3.00	3.00	3.00	3.00
	II-II					
20	Computer Organization A40506	1.00	1.40	0.60	1.40	0.60
21	Database Management Systems A40507	1.80	1.00	1.80	0.60	0.60
22	Object oriented Programming A40503	1.80	1.80	1.80	1.40	1.40
23	Formal Language And Automata Theory A40509	0.60	1.80	0.60	0.60	0.60
24	Design And Analysis Of Algorithms A40508	1.40	1.80	0.60	1.40	0.60

25	Environmental Studies A40009	1.80	1.80	0.60	1.00	2.20
26	Object oriented Programming Programming LAB A40585	3.00	2.8	2.75	2.8	2.75
27	Database Management Systems LAB A40584	3.00	3.00	3.00	3.00	3.00
	III-I					
28	Principles Of Programming Language 55025	1.80	1.80	0.60	0.60	1.80
29	Computer forensics 55028	3.00	3.00	1.40	2.20	1.00
30	Software Engineering 55029	2.33	2.33	2.33	2.33	2.67
31	Micro processing Interface 55030	2.20	2.20	1.00	1.00	1.40
32	Operating System 55031	2.33	1.67	2.00	3.00	2.33
33	Data communication Computer Networks 55032	2.00	1.67	2.33	1.67	1.67
34	Computer network and Operating system Lab 55609	3.00	3.00	3.00	3.00	3.00
35	Micro processing Interface LAB 55608	3.00	3.00	3.00	3.00	3.00
	III-II					
36	Network security 56030	3.00	2.60	1.40	2.20	2.20
37	Compiler Design 56031	1.00	1.40	1.00	1.00	0.60
38	Object Oriented Analysis And Design 56028	1.80	1.80	1.80	0.60	0.60
39	VLSI 56029	3.00	2.60	1.40	2.20	2.20
40	Managerial Economics And Financial Analysis 56023	1.80	1.00	0.60	0.60	1.08
41	Web Technologies 56032	2.20	1.40	2.20	2.60	1.80
42	Web Technologies and compiler Design LAB 56610	3.00	3.00	3.00	3.00	3.00
43	Advanced Communication Skills Lab 56609	3.00	3.00	3.00	3.00	3.00
	IV-I					

44	Linux Programming 57046	1.80	1.80	3.00	2.20	1.80
45	Software Testing Methodologies-57047	3.00	3.00	3.00	2.60	1.80
46	Data Warehousing And Data Mining 57048	3.00	1.80	1.80	3.00	1.80
47	Cloud Computing 57051	3.00	1.80	1.80	3.00	1.80
48	Computer Graphics 57049	3.00	3.00	1.80	1.80	3.00
49	Design Patterns 57054	2.60	2.60	1.40	1.40	1.40
50	Linux Programming Data Warehousing And Data Mining lab-57609	3.00	3.00	3.00	3.00	3.00
51	CASE Tools and Software Testing Methodologies lab 57610	3.00	3.00	3.00	3.00	3.00
	IV-II					
52	Management Science 58007	3.00	3.00	1.80	3.00	1.80
53	Storage Area Networks 58040	3.00	3.00	1.80	1.80	3.00
54	Web services 58035	3.00	3.00	3.00	3.00	1.80
55	Seminar 58618	3	3	3	3	3
56	Industry oriented mini project 58617	3	3	3	3	3
57	Project work 58619	3	3	3	3	3
58	Comprehensive viva 58620	3	3	3	3	3

Attainment of Program Outcomes and Program Specific Outcomes

Describe assessment tools and processes used for measuring the attainment of each of the Program Outcomes and Program Specific Outcomes

Assessment process:

The assessment tools for the Program Outcomes (POs) and Program specific outcomes (PSOs) are categorized into two types:
1. Direct Assessment Tools

2. Indirect Assessment Tools

Assessment Type	Adopted Tools	Assessment Type	Adopted Tools
Direct Assessment	Internal Examination (Theory & Lab)	Indirect Assessment	Program exit survey
	External Examination (Theory & Lab)		Alumni Survey
	Major & Mini Project		Parent Survey
	Seminar & Comprehensive Viva		Employer Survey

Direct Assessments:
The session examinations and the internal assessment, wherein the faculty 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. While setting a question paper, each question is framed based on the POs in order to attain them to a large extent.

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 mapped with to POs. Attainment of Pos is considered from the data of all students.

Calculation of POs and PSOs

Each PO and PSO attained value is calculated by taking weighted average of each PO and PSO by taking into consideration CO attained values. An illustration of the calculation is shown below by considering CO-PO matrix and CO attained value.

Illustration:

CO-PO matrix and CO attained value of subject OOPS Through Java (IIyear & Isem) for academic year 2014-2018:

PO	CO 1	CO 2	CO 3	CO4	CO5	SUM(PO)	PO-level	PO Attai
PO 1	3	3	1	1	1	9	2	0.53
PO 2	1	2	1	2	1	7	2	0.59
PO 3	1	1		1	1	4	1	0.28

PO 4	1	1	1	1	3	7	2	0.50
PO 5	1		1	2	2	6	2	0.53
PO 6								
PO 7								
PO 8								
PO 9								
PO 10								
PO 11	1	1	2	1	2	7	2	0.50
PO 12	3	2	2	2	2	11	3	0.78
PSO 1	1	1	1	1	1	5	1	0.27
PSO 2	2	2	2	2	2	10	2	0.53

Sample Attainment calculation for PO1

PO1 Attainment = $\frac{(1*2.86+2*2.8+2*2.89+2*2.73+2*2.8+2*2.72)}{(1+2+2+2+2+2)} = 2.79$

Indirect Assessment:

Indirect assessment tool for evaluation of the attainment level of POs & PSOs is based on Program exit (conducted at the end of four years of course), Alumni, Parent and Employer survey.

Survey is conducted based on the below format:

S.No.	**POs and PSOs**	**Rate your attainment level**				
		Very High (5)	**High (4)**	**Medium (3)**	**Satisfactory(2)**	**Poor(1)**
1	PO1 statement					
2	PO2 statement					
3	PO3 statement					
. . . 12	. . . PO12 statement					
13	PSO1 statement					
14	PSO2 statement					

Students/ Parents/ Employers providing a rating of equal to and more than 3 are considered for indirect attainment. A percentage of number of Students/ Parents/ Employers providing equal to

and more than 3 to the total participating number of Students/ Parents/ Employers is calculated. Attainment level is found based on the following rule.

Attainment Level 0: If percentage is less than 60%.

Attainment Level 1: If percentage is in between 60% - 70%.

Attainment Level 2: If percentage is in between 70% - 80%.

Attainment Level 3: If percentage is equal to and more than 80%.

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

S.N	Assessment Method	Assessment Frequency	Assessment Tool	In Charge	Reviewer
1	Internal Assessment Test	At the end of 8th and 16th weeks of Each semester.	Student's performance in internal Assessment booklets.	Course owner	HOD
2	Lab Assessment Test	At the end of the Semester	Student's performance in conducting experiments and record writing.	Course owner	HOD
3	Theory Semester Examination	At the end of the Semester	Student's performance in university exams.	University Evaluators	
4	Practical Semester Examination	At the end of semester	Student's performance in conducting experiments during University exams.		
5	Seminar	During the 8th Semester	Rubrics	Seminar Guide/ Seminar Coordinator	HOD
6	Mini project	At the end of the 6th semester	Student's performance in university exams	University Evaluators	
7	Project	During the 8th Semester	Rubrics	Project Guide	HOD
8	Project Work Viva voce	At the end of the 8th semester	Student's performance in university exams	University Evaluators	
9	Course Exit Survey	Semester end	Student Survey	Course Owner	DAC

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

Sl No	Assessment Method	Assessment frequency	Assessment Tool	Incharge	Reviewer
1	Program Exit Survey	Annually	Exit report from graduates	HOD	IQAC
2	Alumni: Survey Questionnaire	Annually	Exit report after 2 years of graduation	HOD	IQAC
3	Parent: Survey Questionnaire	Annually	Parents survey and focus discussions	HOD	IQAC
4	Employer's Feedback	Annually	Performance report on employees	T&P	IQAC

Sreyas Institute of Engineering & Technology

Department of Computer Science & Engineering

Branch, Year & Section: CSE 2014 &A,B,C,D
Type of Survey Exit Survey

S. No	Hall Ticket No.	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
1	14VE1A0501	2	3	2	2	3	2	2	3	3	3	3	1	2	1
2	14VE1A0502	1	3	2	2	1	3	2	3		3	1	2	2	2
3	14VE1A0503	3	2	3		1	2	1	3	1	2	1	3		2
4	14VE1A0504	2	3	2	1	2	3	3	1	3	1	2	3	3	2
5	14VE1A0505	3	2	2	3	1	3	2	2	3	2		2	2	2
6	14VE1A0506	3	2	3	1	3	2	3	2	3	1	3	3	3	2
7	14VE1A0507	3	2	2	3	3		2	3	2	2	1	2	2	2
8	14VE1A0508	2	3	3	2	3	2	3	2	3	2	3	2	3	2
9	14VE1A0509	3	2	3	3	2	2	3	1	2	3	3	1	2	1
10	14VE1A0510	2	3	2	2	3	1	3	2	3	2	3	2	3	1
11	14VE1A0511	2	2	1	2	1	1	2	1	3	3	2	2	2	2
12	14VE1A0512	2	2	3	2	3	2	3	2	3	2		3	3	2
13	14VE1A0513	3	2	1	3	2	3	1	2	2	3	1		2	2
14	14VE1A0514	2	1	2	1	2		3	2	3		3	1	3	1
15	14VE1A0515	1	3	2		2	3	2	2	3	1	2	1	2	2
16	14VE1A0516	2	3	2	2	3	2	1	3	2	3	3	3	2	1
17	14VE1A0517	3	2	2	2		3		1	2	2	3		2	2
18	14VE1A0518	1	2	2	3		2	3	3	3	2	1	3	2	2
19	14VE1A0519	2	1	2	3	1		3	3	2	1	2	2	3	3
20	14VE1A0520	3		2	1	2	2	2		3	2	2	3	2	3
21	14VE1A0521	1	3	2		2	1	2	3	3	1	2	2	2	3
22	14VE1A0522	2	2	1	3	2	2		2	2	2	3	2	3	2
23	14VE1A0523	1	2	1		2	3	3	3	2	2	1	2	2	3
24	14VE1A0524	2	3	3	1		2	3	2	3	2	3	2	3	2
25	14VE1A0525	3	2	1	3	2	3	1		2	2	3	3	2	3

Total Number of Students	111	111	111	111	111	111	111	111	111	111	111	111	111	111
No given Feedback	111	111	111	111	111	111	111	111	111	111	111	111	111	111
% of students given FB	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Average	2.5	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.4
PO #	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

Sreyas Institute of Engineering & Technology

Department of Computer Science & Engineering

Branch, Year & Section: CSE 2014-18 &A,B,C,D
Type of Survey Alumni Survey

S. No	Hall Ticket No.	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
1	14VE1A0508	2	2	3	2	2	2	2	3	3	3	2	3	2	3
2	14VE1A0518	1	2	3	2	2	2	3	1	1	2	1	1	1	1
3	14VE1A0522	1	2	1	1	1	2	2	2	1	1	2	1	1	2
4	14VE1A0525	2	1	3	3	2	3	2	1	3	3	2	3	3	3
5	14VE1A0526	2	2	1	2	1	1	3	2	2	1	2	2	2	2
6	14VE1A0529	3	3	3	3	2	2	1	2	2	3	3	2	3	3
7	14VE1A0535	2	2	3	1	2	3	2	1	1	1	2	2	3	1
8	14VE1A0536	2	1	1	2	2	2	2	1	2	3	1	2	2	1
9	14VE1A0544	1	1	2	2	1	2	1	1	2	1	1	1	2	1
10	14VE1A0545	3	3	3	3	3	3	3	3	3	3	3	3	3	3
11	14VE1A0548	3	3	3	2	2	1	3	3	1	1	1	2	3	3
12	14VE1A0555	3	3	3	3	3	3	3	3	3	3	3	3	2	2
13	14VE1A0557	3	3	3	3	3	3	2	2	2	2	2	2	3	3
14	14VE1A0559	3	3	3	3	3	3	3	3	3	3	3	3	3	3
15	14VE1A0560	2	2	3	2	2	2	2	2	3	2	3	2	2	2
16	14VE1A0564	2	2	2	2	2	2	2	2	2	2	2	2	2	2
17	14VE1A0570	1	2	1	1	2	2	1	1	1	3	1	1	1	2
18	14VE1A0571	2	3	2	2	2	2	2	2	2	2	2	1	2	3
19	14VE1A0585	3	2	3	2	3	3	3	3	2	2	2	2	3	3
20	14VE1A0588	3	3	3	3	3	3	3	3	3	3	3	3	3	3
21	14VE1A0577	3	2	3	2	2	3	3	2	2	3	2	2	2	2
22	14VE1A0589	2	3	2	3	2	3	2	3	2	3	2	3	2	3
23	14VE1A0590	3	3	3	3	3	3	3	3	3	3	3	3	3	3
24	14VE1A0592	3	2	3	2	3	1	3	2	3	3	2	2	1	2
25	14VE1A0593	3	2	3	3	3	3	3	3	3	3	3	3	3	3
Total Number of Students		111	111	111	111	111	111	111	111	111	111	111	111	111	111
No given Feedback		111	111	111	111	111	111	111	111	111	111	111	111	111	111
% of students given FB		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Average		2.5	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.4
PO #		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

An average of all the four surveys is done for each PO and PSO to find the indirect attainment for each PO and PSO

Survey	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
Exit Survey	2.5	2.4	2.3	2.4	2.4	2.4	2.5	2.3	2.4	2.5	2	2.1	2.5	2.4
Parent Feedback	2.3	2.4	2.2	2.2	2.1	2.2	2.5	2.2	2.1	2.1	2.3	2.3	2.2	2.2
Employer feedback	2.5	3	2	2	2.4	2	2	2.4	2.4	2.7	2.3	3	2	2.5
Alumni Feedback	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.3	2.3	2.4
Average	2.45	2.55	2.225	2.25	2.325	2.25	2.35	2.325	2.35	2.425	2.25	2.425	2.25	2.375

The overall attainment of POs & PSOs is calculated with the weight age of 80% of Direct Assessment and 20% of Indirect Assessment.

Provide results of evaluation of each PO & PSO

Program shall set Program Outcome attainment levels for all POs & PSOs.
(The attainment levels by direct (student performance) and indirect (surveys) are to be presented through Program level Course – PO & PSO matrix as indicated).

The results evaluation is made in two levels:

1. Student performance (direct) – 80% value
2. Surveys (indirect) – 20% value

Direct attainment level of PO is determined by taking average across all courses.
Indirect attainment level of PO is determined on the student surveys (alumni).

The following are the observations
The attainment percentage are converted into a scale considering the maximum of 3, *i.e.*, high. Form the calculations, results are tabulated as given below, for the academic year of 2012-16, 2013-17 and 2014-18.

The conclusions are drawn for B. Tech.cse program;

1. 2014-2018: About 24 courses (out of 53 courses) obtained the POs to the tune for more than 75%. About 5 POs (PO1, PO2, PO3, PO5, and PO12) are attained to the tune of 70%, other POs are attained by more than 40%.

2. 2013-2017: About 21 courses (out of 53 courses) obtained the POs to the tune for more than 75%. About 5 POs (PO1, PO2, PO3, PO5, and PO12) are attained to the tune of 70%, other POs are attained by more than 45%.

3. 2012-2016: About 21 courses (out of 53 courses) obtained the POs to the tune for more than 75%. About 5 POs (PO1, PO2, PO3, PO5, and PO12) are attained to the tune of 70%, other POs are attained by more than 45%.

All subjects (Theory and Lab) including projects, seminar and comprehensive viva POs and PSOs attainments are recorded in one table for an academic year.
Below is the POs and PSOs attainment evaluation table for academic years 2014-2018, 2013-17,2012-16.

2014-2018

Course code/ Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
English A10001				0.93						2.78		
Mathematics-I A10002	1.30	0.88	0.43	0.44	0.37							
Mathematical Methods A10003	0.80	0.82	0.42	0.82	0.80							
Engineering Physics A10004	1.29	0.87	0.41	0.87	0.87							
Engineering Chemistry A10005	0.44	0.43	0.40		0.43							
Computer Programming A10501	0.81	1.24	0.41	0.39	0.41							0.47
Engineering Drawing A10301												
Computer Programming lab A10581	3.00	3.00	1.00	1.00	1.00							1.00
Engineering chemistry and physics lab A10081	3.00	3.00	1.00	1.00	1.00							1.00
Engineering/IT workshop	3.00	3.00	1.00	1.00	1.00							1.00

A10082												
English Language Communication skills Lab A10083	3.00	3.00	1.00	1.00	1.00							1.00
probability And Statistics A30008	0.93	0.92	0.65	0.35	0.84			0.20				0. 31
Mathematical Foundations Of Computer Science A30504	2.53	1.71	0.85	2.48	1.57			0.00			0.87	2.53
Data Structures A30502	0.97	0.51	1 .09	0.98	0.98						0.20	1.07
Digital Logic Design A30401	2.70	1.87	1.89	1.81			0.91					0.00
Basic Electrical Engineering A30202	1.64	1.60	1.60	1.60	1.60					0.87	1.63	2.40
Electronic Devices and Circuits -A30404	2.53	1.71	0.85	2.48	1.57						0.87	2.53
Digital Logic Design A30401	2.70	1.87	1.89	1.81			0.91					
Electrical and electronics lab A30282	1.00	1.00	1.00	1.00	1.00							
Data Structures lab- A30582	3.00	2.00	1.00	3.00	2.00						1.00	3.00
Computer Organization A40506	1.87	2.07	1.00	0.95	0.90							
Database Management Systems A40507	0.93	0.93	0.48	0.48	0.40							0.47
JAVA Programming A40503	0.53	0.59	0.28	0.50	0.53						0.50	0.78
Formal Language And Automata Theory A40509	1.63	1.59	0.53	1.63								0.53
Design And Analysis Of	1.33	0.51	1.00	0.67	1.18						1.18	1.24

Algorithms A40508												
Environmental Studies A40009	0.60	0.40	0.60	0.20	0.60							
JAVA Programming LAB A40585	2.19	1.23	2.22	2.00	2.60							2.58
Database Management Systems LAB A40584	2.19	1.20	2.22	2.00	2.60							2.58
Principles Of Programming Language A50511	1.35	1.44	0.69	0.60								0.47
Disaster Management A50117	1.00		2.67	1.33		1.00		2.57	2.00			2.57
Software Engineering A50518	2.25	2.75	2.22	2.75					3	2.27	2.25	2.25
Compiler Design 50514	1.39	1.41	1.31	1.33	1.31	0.47	0.47	0.47	0.47	0.47	0.47	1.31
Operating System A50510	1.86	1.94	1.03	2.97	0.00							2.14
Computer Networks A50515	2.75	2.25	2.33	3	3							1.20
Operating System Lab A50589	1.00	1.00	1.00	1.00	2.00					1.00	1.00	1.00
Compiler Design lab A50587	2.00	2.00	1.00	3.00	3.00					1.00	1.00	2.00
Distributed Systems A60521	1.47	1.38										0.69
Information Security A60522	1.39	1.38	0.68	2.09	2.03					0.60		1.47
Object Oriented Analysis And Design A60524	0.69	1.45	0.69	1.37	2.12				0.69	0.00	2.11	1.51
Software Testing Methodologies A60525	1.39	1.41	0.67	1.39	2.03							

Managerial Economics And Financial Analysis A60010	1.39	1.41	0..68	2.09	2.03							1.35
Web Technologies A60512	1.39	1.41	1.41	2.09	2.03						1.47	1.43
CASE Tools and Web Technologies Lab A60591	1.00	2.00	2.00	2.00	2.00					3.00	3.00	3.00
Advanced Communication Skills Lab A60086	1.00	1.00	0.00	1.00					1.00	2.00	0.00	2.00
DATAMINING AND DATAWAREHOUSING A70520	1.38	1.40	1.38	1.39	2.07						0.72	2.08
CLOUD COMPUTING A70519	1.32	1.33	1.34	1.99	1.99						1.36	1.99
COMPUTER FORENSICS A70528	1.86	2.80	1.85	1.87	2.79						1.86	2.79
COMPUTER GRAPHICS A70529	2.72	1.84	1.86	2.74	2.75						0.00	1.79
DESIGN PATTERNS A70530	1.50	1.50	1.49	2.24	1.49						1.50	1.50
DATAWAREHOUSING AND DATAMINING LAB A70595	1.91	1.90	1.92	1.91	2.86						0.00	2.88
LINUX PROGRAMMING A70517	1.85	1.85	1.85	2.81	1.85				0.97		0.96	2.79
LINUX PROGRAMMING LAB A70596	0.34	1.06	1.06	0.71	0.71					1.07	1.07	1.06
MANAGEMENT SCIENCE A80014	0.67	0.68	1.05	0.69	0	0.70 2	2	3	0	0	0.71 0	0.35 0 3

STORAGE AREA NETWORKS A80550	0.74	0.76	1.48	1.47	2.20						2.21	2.20
WEB SERVICES A80551	1.06	1.05	1.06	0.50	1.59						0.00	1.06
SEMINAR A80089	3	1	2	1	2	1	1					2
MINI PROJECT A80087	1.75	2.54	1.60	2.60	2.42			1.67	2.50	1.60	2.5	2.5
PROJECT WORK-A80088	2.28	1.96	1.89	1.99	2.24	1.56	2.16	0.85	1.38	1.30	1.83	2.86
COMPREHENSIVE VIVA-A80090	3	3	2	3	3		2				2	3
B. Tech. CSE, Direct attainment (3 Max)	1.60	1.47	1.13	1.46	1.30	0.08	0.12	0.09	0.20	0.30	0.58	1.86
B. Tech. CSE, Direct attainment (100%)	53.3	49	37.6	48.6	43.3	2.66	4	3	6.66	10	19.3	62
B. Tech. CSE, Direct attainment (80%)	42.64	39.2	30.08	38.8	34.6	2.12	3.2	2.4	5.32	8	15.44	49.6
B. Tech. CSE, Indirect attainment (20%)	15.63	15.72	15.43	15.06	14.83	15.07	16.33	15.03	15.50	14.32	15.45	15.02
Total attainment(100)%	58.27	54.92	45.51	53.86	49.43	17.19	19.53	17.43	20.82	22.32	30.89	64.62
Total attainment(3 Max)	1.74	1.64	1.36	1.61	1.48	0.51	0.58	0.52	0.62	0.66	0.92	1.93

2013-2017

Course code/ Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
English A10001		0.68		0.68						2.02	0.00	0.00
Mathematics I A10002	0.19	0.19	0.19	0.17	0.12							
Mathematical Methods A10003	0.47	0.45	0.33	0.31	0.15							
Engineering Physics	0.41	0.28	0.25	0.09	0.18							

A10004												
Engineering Chemistry A10005	0.39	0.38	0.39		0.38							
Computer Programming A10501	1.18	1.75	0.58	0.58	0.59							0.58
Engineering Drawing A10301	0.50	0.25	0.25	0.25	0.25							
Computer Programming lab A10581	3.00	3.00	1.00	1.00	1.00							1.00
Engineering chemistry and physics lab A10081	2.00	1.00	1.00	1.00	1.00							
Engineering/IT workshop A10082	2.00	1.00	1.00	1.00	3.00							
English Language Communication skills Lab A10083		1.00								3.00		
Probability And Statistics A30008	1.51	1.07	0.60	0.47								1.11
Mathematical Foundations Of Computer Science A30504	1.43	0.87	0.45	1.30			0.33					1.33
Data Structures A30502	0.76	0.80	0.87	0.86	0.80							1.20
Digital Logic Design A30401	2.57	1.72	1.81	1.71			0.85					
Basic Electrical Engineering A30202	1.56	1.36	0.43	0.70	0.40							
Electronic Devices and Circuits-A30404	1.00	0.80	0.40	0.40	0.60							
A30282 Electrical and electronics lab	1.00	1.00	1.00	1.00	1.00							
Data Structures lab-	2	1	1	1	2							

A30582												
Computer Organization A40506	1.72	1.53	1.00	0.65	0.73							1.53
Database Management Systems A40507	1.73	1.73	1.71	1.71	1.73							0.82
JAVA Programming A40503	0.74	0.74	0.35	0.76	0.84						0.84	1.22
Formal Language And Automata Theory A40509	2.40	2.47	0.83	2.49	0.00						0.00	0.83
Design And Analysis Of Algorithms A40508	0.53	0.53	0.48	1.23						1.32	1.09	1.42
Environmental Studies-A40009	0.87	0.53	0.73	0.20								
JAVA Programming LAB-A40585	3.00	3.00	1.00	1.00	1.00							1.00
Database Management Systems LAB-A40584	2.19	1.20	2.22	2.00	2.60							2.58
Principles Of Programming Language A50511	0.78	0.90	0.43	0.30								0.20
Disaster Management A50117	1.00	0.00	2.67	1.33	0.00	1.00		2.57	2.00			2.57
Software Engineering A50518	1.70	1.67	1.62	1.57	0.85	0.00	0.00	0.00	2.45		0.83	1.82
Compiler Design A50514	1.60	1.71	0.80	2.45	2.25					0.80	0.75	1.71
Operating System A50510	1.28	1.31	0.69	2.00	0.00							1.44
Computer Networks A50515	3	3	2.04	3	3							1.07
Operating System Lab A50589	1.00	1.00	1.00	2.00	2.00					1.00	1.00	1.00

Compiler Design lab A50587	1.60	1.71	0.80	2.45	2.25					0.80	0.75	1.71
Distributed Systems A60521	1.93	1.79										0.91
Information Security A60522	1.60	1.48	0.85	2.35	2.30					0.60	0.00	1.73
Object Oriented Analysis And Design A60524	0.96	1.98	1.00	1.90	2.89				0.93		2.95	2.09
Software Testing Methodologies A60525	1.87	1.83	0.96	1.87	2.73							1.84
Managerial Economics And Financial Analysis A60010	2.24	2.17	1.15	2.22	2.13							2.05
Web Technologies A60512	1.71	1.71	1.71	2.56	2.53							1.73
CASE Tools and Web Technologies Lab A60591	1.00	2.00	2.00	2.00	2.00					3.00	3.00	3.00
Advanced Communication Skills Lab A60086	1.00	1.00	0.00	1.00					1.00	2.00		2.00
Linux Programming 57046	2.10	2.10	2.10	2.15	2.30							2.15
Computer forensics 57611	0.45	0.91	0.91	0.82	0.91						0.45	0.91
Data Warehousing And Data Mining 57048	2.00	1.96	1.90	1.90	1.92							2.87
Cloud Computing 57051	1.76	0.88	1.70	1.76	1.76					1.00	0.85	2.64
Computer Graphics 57049	0.90	0.87	0.41	0.93	0.92							0.97
Design Patterns 57054	2.19	2.30	1.09	3.33	2.13						2.34	2.40
Linux Programming lab 57609	1.00	2.00	2.00	2.00	2.00					3.00	3.00	3.00
Data Warehousing	2.00	1.00	2.00	2.00	2.00							3.00

And Data Mining lab 57610												
Management Science 58007	2.13	2.10	1.08	1.08				1.00	1.07	0.00	2.43	2.11
Storage Area Networks 58040	1.01	1.14	0.45	0.90								1.09
SEMINAR A80089	3	1	2	1	2	1	1					2
MINI PROJECT A80087	1.75	2.54	1.60	2.60	2.42			1.67	2.50	1.60	2.5	2.5
PROJECT WORK-A80088	2.28	1.96	1.89	1.99	2.24	1.56	2.16	0.85	1.38	1.30	1.83	2.86
COMPREHENSIVE VIVA-A80090	3	3	2	3	3		2				2	3
B. Tech. CSE, Direct attainment (3 Max)	1.4	1.3	1.0	1.3	1.1	0.06	0.1	0.1	0.1	0.3	0.4	1.2
B. Tech. CSE, Direct attainment (100%)	46.6	43.3	33.3	43.3	36.6	2	3.3	3.3	3.3	10	13.3	40
B. Tech. CSE, Direct attainment (80%)	37.28	34.6	26.6	34.6	29.2	1.6	2.64	2.64	2.64	8	10.64	32
B. Tech. CSE, Indirect attainment (20%)	14.3	13.6	13.6	15.5	12.9	13.9	10.2	9.8	17.2	13.6	16.9	15.4
Total attainment(100)%	51.58	48.2	40.2	50.1	42.1	15.5	12.84	12.44	19.84	21.6	27.54	47.4
Total attainment(3 Max)	1.54	1.44	1.20	1.50	1.26	0.46	0.38	0.38	0.59	0.64	0.82	1.42

2012-2016

Course code/ Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
English		0.86								2.56		
Mathematics-I	0.41	0.41	0.43	0.42	0.33							
Mathematical Methods	1.04	1.06	1.08	1.08	0.90							
Engineering Physics	103	0.71	0.40	0.31	0.35							
Engineering Chemistry	0.13	0.80	0.11	0.00	0.09							
Computer Programming and data structures	1.18	1.73	0.58	0.58	0.58							0.58
Engineering Drawing	2.00	1.00	1.00	1.00	1.00							
Computer Programming lab	3.00	3.00	1.00	1.00	1.00							1.00
Engineering Physics and Engineering Chemistry Lab	2.00	1.00	1.00	1.00	1.00							
English Language Communication skills Lab		1.00								3.00		
IT Workshop/Engineering workshop	2.00	1.00	1.00	1.00	3.00							
Probability And Statistics A30008	1.80	1.28	0.60	0.60								1.29
Mathematical Foundations Of Computer Science A30504	2.33	1.59	0.80	2.33			0.87					2.42
Data Structures through C++ A30502	1.53	1.33	1.44	1.58	1.52							2.24
Digital Logic Design A30401	1.43	0.92	1.01	0.91			0.45					
Basic Electrical Engineering A30202	1.75	1.52	0.57	0.87	0.93							
Electronic Devices and Circuits-A30404	1.40	1.07	0.60	0.60	0.87							
A30282 Electrical and electronics lab	1.00	1.00	1.00	1.00	1.00							
Data Structures lab-A30582	2.00	2.00	2.00	2.00	2.00							3.00
Computer Organization A40506	0.00	0.87	0.47	0.45								
Database Management Systems A40507	0.81	0.81	0.85	0.85	0.67							0.38
Object oriented Programming A40503	1.24	1.35	0.65	1.18	1.33						1.22	1.91
Formal Language And Automata Theory A40509	0.94	0.90	0.32	0.92								0.24

Design And Analysis Of Algorithms A40508		0.48	0.43	1.14							1.00	1.24
Environmental Studies A40009	0.60	0.67	0.20	0.73	0.60							
Object oriented Programming Programming LAB A40585	3.00	3.00	1.00	1.00	1.00							1.00
Database Management Systems LAB A40584	2.19	1.20	2.22	2.00	2.60							2.58
Principles Of Programming Language 55025	1.05	0.92	0.48	0.60								0.60
Computer forensics 55028	1.71	1.79	1.53	1.60	1.53	0.33	0.33	0.33	0.33	0.33	0.33	1.53
Software Engineering 55029	0.60	1.14	0.60	1.03	1.48				0.48		1.42	1.08
Micro processing Interface 55030	1.93	1.76	0.50	1.93	0.67							
Operating System 55031	1.69	1.64	1.00	2.73								2.03
Data communication Computer Networks 55032	2.28	2.21	1.41	2.26	2.21							0.73
Computer network and Operating system Lab 55609	2.00	2.00	2.00	2.00	2.00							3.00
Micro processing Interface LAB 55608	1.00	1.00	1.00	1.00	1.00							
Network security 56030	2.30	1.50	1	2								
Compiler Design 56031	0.80	0.78	0.42	1.18	1.13					0.27		0.86
Object Oriented Analysis And Design 56028	0.60	1.14	0.60	1.03	1.48				0.48		1.42	1.08
VLSI 56029	0.60	1.14	0.60	1.03	1.48				0.48		1.42	1.08
Managerial Economics And Financial Analysis56023	0.75	0.80	0.32	1.18	1.13							0.75

Web Technologies 56032	1.71	1.56	1.56	2.53	2.47						2.00	1.87
WebTechnologies and compiler Design LAB 56610	1.00	2.00	2.00	2.00	2.00					3.00	3.00	3.00
Advanced Communication Skills Lab 56609	1. 00	1.00		1.00					1.00	2.00	0.00	2.00
Linux Programming 57046	1.56	1.68	1.56	1.76	1.92							1.76
Software Testing Methodologies-57047	1.07	0.90	2.15	2.15	2.13						1.00	2.60
Data Warehousing And Data Mining 57048	0.80	0.60	1.90	1.90	1.92	1.92	0.60	0.60	2.96	2.95	2.95	2.96
Cloud Computing 57051	2.00	0.96	2.00	1.92	1.92					0.60	0.95	2.88
Computer Graphics 57049	2.73	1.91	1.00	2.90	2.95							2.00
Design Patterns 57054	1.44	1.50	0.72	2.13	1.52						1.31	1.24
Linux Programming Data Warehousing And Data Mining lab-57609	1.00		2.00	2.00	2.00					3.00	3.00	3.00
CASE Tools and Software Testing Methodologies lab 57610	2.00		2.00	2.00	2.00						1.00	3.00
Management Science 58007	1.04		1.05	1.05							1.20	1.03
Storage Area Networks 58040	0.96		0.95	0.95								0.97
Web services 58035	1.15	2.20	1.12	1.00	2.33							1.12
Seminar 58618	3	1	2	1	2	1	1					2
Industry oriented mini project 58617	1.5	2.19	1.40	2.30	2.08			1.50	2.20	1.4	2.2	2.2
Project work 58619	2	3	2	3	3			2	3	2	3	3
B. Tech. CSE, Direct attainment (3 Max)	1.3	1.2	1.0	1.3	1.1	0.05	0.05	0.07	0.19	0.37	0.49	1.18
B. Tech. CSE, Direct attainment (100%)	43.3	40	33.3	43.3	36.6	1.6	1.6	2.33	6.33	12.3	16.33	36.6
B. Tech. CSE, Direct attainment (80%)	34.64	32	26.64	34.64	29.28	0.48	0.48	2.02	5.06	9.84	13.06	29.28

B. Tech. CSE, Indirect attainment (20%)	14.1	13.0	12.9	14.0	12.6	13.7	6.1	5.5	17.1	12.9	17.2	14.9
Total attainment(100)%	48.74	45	39.54	48.64	41.88	14.18	6.58	7.52	22.16	22.74	30.26	44.18
Total attainment(3 Max)	1.44	1.35	11.86	1.45	1.25	0.42	0.19	0.22	0.66	0.68	0.90	1.32

PSO Attainment for A.Y.: 2014-2018

Course code/ Course title	PSO1	PSO2
English A10001		
Mathematics-I A10002		
Mathematical Methods A10003		
Engineering Physics A10004		
Engineering Chemistry A10005		
Computer Programming A10501	1.23	1.23
Engineering Drawing A10301		
Computer Programming lab A10581	2	2
Engineering chemistry and physics lab A10081	2	2
Engineering/IT workshop A10082	2	2
English Language Communication skills Lab A10083	2	2
probability And Statistics A30008	0.40	0.45
Mathematical Foundations Of Computer Science A30504	1.6	0.73
Data Structures A30502	0.91	0.45
Digital Logic Design A30401	0.98	
Basic Electrical Engineering A30202		
Electronic Devices and Circuits	1.68	0.73

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-A30404		
Electrical and electronics lab A30282	1.56	1.64
Data Structures lab- A30582	2	1
Computer Organization A40506	0.96	1.07
Database Management Systems A40507	0.48	1
JAVA Programming A40503	0.27	0.5
Formal Language And Automata Theory A40509	1.13	0.53
Design And Analysis Of Algorithms A40508	1.24	0.45
Environmental Studies A40009		
JAVA Programming LAB A40585	2.2	2.3
Database Management Systems LAB A40584	2.2	2.2
Principles Of Programming Language A50511	0.69	0.69
Disaster Management A50117	1.2	1
Software Engineering N A50518	1.50	1.50
Compiler Design 50514	1.39	1.3
Operating System A50510	2.0	1
Computer Networks A50515	2.6	1.2
Operating System Lab A50589	2	1
Compiler Design lab A50587	2	3
Distributed Systems A60521	2.15	1.39
Information Security A60522	1.3	1.2
Object Oriented Analysis And Design A60524	0.6	2
Software Testing Methodologies	1.3	1.5

A60525					
Managerial Economics And Financial Analysis A60010	1.3	1.5			
Web Technologies A60512	1.3	1.5			
CASE Tools and Web Technologies Lab A60591	2	1			
Advanced Communication Skills Lab A60086		1			
DATAMINING AND DATAWAREHOUSING A70520	2	2			
CLOUD COMPUTING A70519	1.9	1.3			
COMPUTER FORENSICS A70528	2.7	2.7			
COMPUTER GRAPHICS A70529	1.8	1.8			
DESIGN PATTERNS A70530	1.4	1.4			
DATAWAREHOUSING AND DATAMINING LAB A70595	2.8	2.8			
LINUX PROGRAMMING A70517	2.8	2.7			
LINUX PROGRAMMING LAB A70596	1	1			
MANAGEMENT SCIENCE A80014	0.3 2	0.3 2	3	0	0
STORAGE AREA NETWORKS A80550	2.2	1.4			
WEB SERVICES A80551	1	1			
SEMINAR A80089	2	2			
MINI PROJECT A80087	1.6	1.6			
PROJECT WORK- A80088	2.6	2.3			
B. Tech. CSE, Direct attainment (3 Max)	1.33	1.20			
B. Tech. CSE, Direct attainment (100%)	44.33	40.00			
B. Tech. CSE, Direct attainment (80%)	35.46	32.00			
B. Tech. CSE, Indirect attainment (20%)	15	14.4			
Total attainment, %	50.46	46.4			
Total attainment(3 Max)	1.51	1.39			

Course code/ Course title	PSO1	PSO2
English A10001		
Mathematics I A10002		
Mathematical Methods A10003		
Engineering Physics A10004		
Engineering Chemistry A10005		
Computer Programming A10501	1.78	1.78
Engineering Drawing A10301		
Computer Programming lab A10581	2.00	2.00
Enginnering chemistry and physics lab A10081		
Engineering/IT workshop A10082		
English Language Communication skills Lab A10083		
Probability And Statistics A30008	0.38	0.27
Mathematical Foundations Of Computer Science A30504	0.91	0.33
Data Structures A30502	0.75	0.80
Digital Logic Design A30401	0.98	0.00
Basic Electrical Engineering A30202		
Electronic Devices and Circuits-A30404		
A30282 Electrical and electronics lab		
Data Structures lab-A30582	2	1
Computer Organization A40506	0.72	0.89
Database Management Systems A40507	1.71	1.67
JAVA Programming A40503	0.40	0.89
Formal Language And Automata Theory A40509	1.77	0.83

Design And Analysis Of Algorithms A40508	0.69	0.52
Environmental Studies-A40009		
JAVA Programming LAB-A40585	2.00	2.00
Database Management Systems LAB-A40584	2.22	2.24
Principles Of Programming Language A50511	0.43	0.43
Disaster Management A50117	1.20	1.00
Software Engineering A50518	1.67	0.83
Compiler Design A50514	1.60	2.50
Operating System A50510	1.37	0.69
Computer Networks A50515	2.37	1.07
Operating System Lab A50589	2.00	1.00
Compiler Design lab A50587	1.60	2.50
Distributed Systems A60521	2.80	1.81
Information Security A60522	1.60	1.70
Object Oriented Analysis And Design A60524	0.95	2.98
Software Testing Methodologies A60525	1.87	2.00
Managerial Economics And Financial Analysis A60010	2.24	2.57
Web Technologies A60512	1.71	1.77
CASE Tools and Web Technologies Lab A60591	2.00	1.00
Advanced Communication Skills Lab A60086	0.00	1.00
Linux Programming 57046	2.15	2.22
Computer forensics 57611	0.91	0.91
Data Warehousing And Data Mining 57048	2.85	2.81
Cloud Computing	2.64	1.76

57051		
Computer Graphics 57049	0.90	0.95
Design Patterns 57054	2.16	2.24
Linux Programming lab 57609	3.00	3.00
Data Warehousing And Data Mining lab 57610	3.00	3.00
Management Science 58007	2.13	2.34
Storage Area Networks 58040	1.01	1.03
Seminar 58618	2	2
Industry oriented mini project 58617	1.45	1.45
Project work 58619	2	2
B. Tech. CSE, Direct attainment (3 Max)	1.2	1.1
B. Tech. CSE, Direct attainment (100%)	40	36.6
B. Tech. CSE, Direct attainment (80%)	32	29.2
B. Tech. CSE, Indirect attainment (20%)	15.2	14.06
Total attainment, %	47.2	43.26
Total attainment(3 Max)	1.4	1.29

PSO Attainment A.Y.: 2012-2016

Course code/ Course title	PSO1	PSO2
English		
Mathematics-I		
Mathematical Methods		
Engineering Physics		
Engineering Chemistry		
Computer Programming and data structures	1.7	1.7
Engineering Drawing		
Computer Programming lab	2	2
Engineering Physics and Engineering Chemistry Lab		
English Language Communication skills Lab		
IT Workshop/Engineering workshop		
Probability And Statistics A30008	0.4	0.4

Mathematical Foundations Of Computer Science A30504	1.6	0.8
Data Structures through C++ A30502	1.4	1.4
Digital Logic Design A30401	0.6	
Basic Electrical Engineering A30202		
Electronic Devices and Circuits-A30404		
A30282 Electrical and electronics lab		
Data Structures lab-A30582	3	2
Computer Organization A40506	0.4	
Database Management Systems A40507	0.8	0.9
Object oriented Programming A40503	0.6	1.2
Formal Language And Automata Theory A40509	0.7	0.3
Design And Analysis Of Algorithms A40508	0.6	
Environmental Studies A40009		
Object oriented Programming Programming LAB A40585	2	2
Database Management Systems LAB A40584	2.2	2.2
Principles Of Programming Language 55025	1.8	1.6
Computer forensics 55028	1.7	1.5
Software Engineering 55029	0.45	1.55
Micro processing Interface 55030		
Operating System 55031	1.7	0.9
Data communication Computer Networks 55032	1.5	0.7
Computer network and Operating system Lab 55609	3	2
Micro processing Interface LAB 55608		

Network security 56030	2	2
Compiler Design 56031	0.8	0.8
Object Oriented Analysis And Design 56028	0.4	1.5
VLSI 56029	0.45	1.55
Managerial Economics And Financial Analysis 56023	0.7	0.7
Web Technologies 56032	1.7	1.8
Web Technologies and compiler Design LAB 56610	2	1
Advanced Communication Skills Lab 56609		1
Linux Programming 57046	2.6	2.6
Software Testing Methodologies-57047	2.5	2.5
Data Warehousing And Data Mining 57048	2.9	2.9
Cloud Computing 57051	2.7	2
Computer Graphics 57049	1.9	1.9
Design Patterns 57054	1.3	1.4
Linux Programming Data Warehousing And Data Mining lab-57609	3	3
CASE Tools and Software Testing Methodologies lab 57610	3	3
Management Science 58007	1	1.1
Storage Area Networks 58040	0.9	0.9
Web services 58035	2.1	2.4
Seminar 58618	2	2
Industry oriented mini project 58617	1.5	1.6
Project work 58619	2	2
Comprehensive viva 58620	3	2

B. Tech. CSE, Direct attainment (3 Max)	1.1	1.1
B. Tech. CSE, Direct attainment (100%)	36.6	36.6
B. Tech. CSE, Direct attainment (80%)	29.2	29.2
B. Tech. CSE, Indirect attainment (20%)	15.26	14.06
Total attainment, %	44.4	44.4
Total attainment(3 Max)	1.3	1.3

Program level Course-PO and PSO matrix of all courses including First years

Direct attainment level of a PO is determined by taking average across all courses addressing the PO.

1. Fractional numbers may be used, for example 1.55.

Indirect attainment level of a PO is determined based on the student exit surveys, employer surveys, co-curricular activities, extracurricular activities etc.

Example:

1. It is assumed that a particular PO has been mapped for four courses - C2O1, C3O2, C3O3, and C401.
2. The attainment level for each of the courses will be as per the examples as shown in 3.2.2.
3. PO attainment level will be based on attainment levels of direct assessment and indirect assessment.
4. It is assumed that while deciding on overall attainment level, 80% weightage may be given to direct assessment and 20% weightage to indirect assessment through surveys from students(largely) and employers (to some extent). Program may have different weightage with appropriate justification.
5. Assuming following actual attainment levels:

Direct Assessment
C201 –High (3)
C302 – Medium (2)
C303 – Low (1)
Attainment level will be summation of levels divided by no. of courses 3+2+1+3/4= 9/4=2.25

Indirect Assessment
Surveys, Analysis, customized to an average value as per levels 1, 2 & 3.
Assumed level - 2

PO Attainment level will be 80% of direct assessment + 20% of indirect assessment
i.e. 1.8 + 0.4 = 2.2.

The following are the conclusions

The curriculum has approximately weightage of 60% theory and 40% practical's.

Direct assessment:

PO 1 through PO 4 is highly achieved. These POs are rigid in nature and are appropriately attained through examination and project. PO 5 to PO 11 are attained (>55%) and are known as soft outcomes and requires Co-curricular and extra-curricular activities to attain them.

POs 8, 9, 10 and 11 are fulfilled by providing the necessary co-curricular activities, seminars, conferences, debate, essay writing, games, quizzes, poster presentations, publications, dance, music, workshops, industrial visits, pre-placement training, personality development programmes etc., which are not included in the above calculation as assessment. The POs 8, 9, 10 and 11 are evidenced by the students entered into higher education (both in India and abroad).

Surveys and analysis: All POs (PO1 to PO11) have high attainability (from 75 to 94%) suggesting the holistic growth of the students, considering all co-curricular and extracurricular activities.

1. PO 1, PO 2, PO 3, PO 4 PO 5, PO 6 and PO 8 have nearly identical attainment in three years. In these POs, the attainment achieved is high in 2017-18 compared to 2012-16.

2. The PO 7, PO 9, PO 10 and PO 11 have attained nearly 60 to 70% in three years. In these POs,the attainment is higher in 2013-17.

3. The improvement attained in POs in 2017-18 is acceptable with the success index indicated in aggregate of 4 years of 2013-17, and also in individual years (Table 3.3.1d).

4. The indirect attainment of POs is higher compared to direct attainment observed, maybe on account of survey and opinion polls.

5. Direct attainment level of a PO is determined by taking average across all courses addressing that PO.
   Fractional numbers may be used.

Indirect attainment level of a PO is determined based on the student exit surveys, employer surveys, co-curricular activities, extracurricular activities etc.

Example:

6. It is assumed that a particular PO has been mapped for four courses C2O1, C3O2, C3O3 and C401.

7. The attainment level for each of the four courses will be as per the examples shown in graph format
8. PO attainment level will be based on attainment levels of direct assessment and indirect assessment
9. It is assumed that while calculating overall attainment level 80% weightage may be given to direct assessment and 20% weightage to indirect assessment through surveys from students(largely) and employers (to some extent). Program may have different weightage with appropriate justification.
10. Assuming following actual attainment levels:

Direct Assessment

C201 –High (3)
C302 – Medium (2)
C303 – Low (1)

Attainment level will be summation of levels divided by number of courses 3+2+1+3/4= 9/4=2.25

Indirect Assessment
Surveys, Analysis, customized to an average value as per levels 1, 2 & 3.
Assumed level - 2
PO Attainment level will be 80% of direct assessment + 20% of indirect assessment i.e. 1.8 + 0.4 = 2.2.

The following are the conclusions

The curriculum has approximately weightage of 60% theory and 40% practicals.

Direct assessment: PO1 through PO5 is highly achieved. These POs are difficult in nature and are appropriately attained through examination and project. PO10, 12 are attained (>50%). These are known as soft outcomes and require the Co-curricular and extra-curricular activities to attain them.

POs6,7 8, 9, and 11 are fulfilled by providing the necessary co-curricular activities, seminars, conferences, debate, essay writing, games, quizzes, poster presentations, publications, dance, music, workshops, industrial visits, pre-placement training, personality development programmes etc., which are not included in the above calculation as assessment.

Surveys and analysis: All POs (PO1 to PO12) have high attainability (from 75 to 94%) suggesting the holistic growth of the students, by considering all co-curricular and extracurricular activities.

1. PO1, PO2, PO3, PO4 PO5, PO6 and PO8 have nearly identical attainment in three years. In these POs, the attainment achieved is high in 2014-18 compared to 2013-17. The attainment in2014-18 is nearly same, though the second semester is not completed.

2. The P7, PO 9, PO 10 and PO 11 have attained nearly 60 to 70% in three years.

3. The indirect attainment of POs is higher compared to direct attainment observed, may be on account of surveys and opinion polls.

Program level Course-PO and PSO matrix of all courses INCLUDING academic years

Table 3.3.1d: Comparison of POs and PSOs

	2014-18	**2013-17**	**2012-16**
PO 1	58.27	51.5	48.74
PO 2	54.92	48.2	45
PO 3	45.51	40.2	39.54
PO 4	53.86	50.1	48.64
PO 5	49.43	42.1	41.88
PO 6	17.19	15.5	14.18
PO 7	19.53	12.8	6.58
PO 8	17.43	12.4	7.52
PO 9	20.82	19.8	22.16
PO 10	22.32	21.6	22.74
PO 11	30.89	27.54	30.26
PO 12	64.62	47.4	44.18
PSO1	50.46	47.2	44.4
PSO2	46.4	43.2	44.4

DEPARTMENT OF MECHANICAL ENGINEERING

Evaluation of Attainment of Programme outcomes and Course Outcomes

Establish the correlation between the courses and the Program Outcomes (POs) and Program Specific Outcomes (PSOs)

PSO1: Good skills on CNC, CAD & CAE for precision systems design and development.

PSO2: Knowledge and skills of designing and manufacturing various mechanical systems.

Course Outcomes (COs) (SAR should include course outcomes of one course from each semester of study, however, should be prepared for all courses and made available as evidence, if asked)

The course outcomes are prepared for each course (each subject) in consideration to the syllabus prescribed by the JNTUH. At least one course outcome is formulated for each unit of the course by the respective subject faculty. Revised Bloom's Taxonomy action verbs are used to formulate the course outcomes.

The following tables show the course outcomes for a selected course from 3rd to 8th semester of 2017-2018 academic year.

CAY 2017-18

Table 2.6.2.1 Metallurgy and Material Science **Year & Sem:** II-I

S.No	CO	Course Outcome
1	C214.1	Ability to remember basic concept of about crystal structures, Engineering materials, metals, alloys and their properties.(TL1)
2	C214.2	Ability to understand alloy system , phase diagram and various invariant reactions. (TL2)
3	C214.3	Ability to apply leaver rule and tile line rule for identifying the phase present in phase diagram. (TL3)
4	C214.4	Ability to examine Fe-Fe3C phase diagrams, TTT diagram, various heat treatments. (TL4)
5	C214.5	Ability to examine various cast irons based up the Carbon % and heat treatment and examine various non ferrous metals. (TL4)
6	C214.6	Ability to understand Modern materials & Unconventional materials such as composites, plastics, polymers etc. (TL2)

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Table 2.6.2.2 Fluid Mechanics and Hydraulic Machines **Year & Sem:** II-II

S.No	CO	Course Outcome
1	C222.1	Apply the knowledge of basic principles of fluid mechanics. (TL 3)
2	C222.2	Analyze the fluid flow problems with application of momentum and energy equations. (TL 4)
3	C222.3	Analyze the boundary layer concept. (TL 4)
4	C222.4	Calculate the friction factor in pipes by considering the losses in pipes. (TL 4)
5	C222.5	Evaluate the performance of turbines (TL 5)
6	C222.6	Analyze the performance of pumps. (TL 4)

Table 2.6.2.3 Course Name: Machine Tools **Year & Sem:** III-I

S.No	CO	Course Outcome
1	C314.1	Classify the mechanics of metal cutting and selection of tool materials. (TL 3)
2	C314.2	Apply the knowledge of using lathe machine for removal of material. (TL 3)
3	C314.3	Explain the working of shaper and slotting machinery. (TL 2)
4	C314.4	Discuss the process of drilling and boring. (TL 2)
5	C314.5	Comprehend speed and feed mechanisms of machine tools. (TL 2)
6	C314.6	Explain the working of grinding machine and selection of abrasive particles. (TL 2)

Table 2.6.2.4 Refrigeration & Air conditioning **Year & Sem:** III-II

S.No	CO	Course Outcome
1	C323.1	Calculate the C.O.P of a Refrigeration system for a given Refrigerant. (TL 4)
2	C323.2	Demonstrate working principle and components of RAC system. (TL 2)
3	C323.3	Evaluate the performance of vapour absorption refrigeration systems. (TL 5)

4	C323.4	Analyse the performance of vapour compression refrigeration systems. (TL 4)
5	C323.5	Estimate the internal heat loads, sensible heat factor and grand sensible heat factor. Illustrate concept of human comfort. (TL 5)
6	C323.6	Selection of components of air conditioning systems for effective utilization of the system.. (TL 1)

Table 2.6.2.5 Course Name: Power Plant Engineering **Year & Sem:** IV-I

S.No	CO	Course Outcome
1	C412.1	List out various resources of energy and power that is developed in India. (TL 1)
2	C412.2	Define different layouts of power plants and classify them for improving its performance. (TL 1)
3	C412.3	Demonstrate characteristics of different layouts and plant auxiliaries of hydroelectric power plant. (TL 2)
4	C412.4	Describe different types non conventional power sources. (TL 2)
5	C412.5	Explain the working of nuclear power plant. (TL 2)
6	C412.6	Understand load curve, connected load, max demand, demand factor, load factor, diversity factor. Identify how pollution from power plant affects the system and its control by using control methods. (TL 2)

Table 2.6.2.6: Renewable Energy Sources **Year & Sem:** IV-II

S.No	CO	Course Outcome
1	C423.1	Describe the importance of Renewable energy sources compared to Fossil fuels. (TL 2)
2	C423.2	Choose the most appropriate renewable energy technology based on local conditions. (TL6)
3	C423.3	Illustrate source, potential, types and performance characteristics of wind mills. (TL 2)
4	C423.4	Describe principles of biomass conversion, types of bio-gas digesters and applications. (TL 2)

5	C423.5	Design renewable/hybrid energy systems to meet specific energy consumption and environmental impact (TL 6)
6	C423.6	Design renewable energy system to meet specific energy environment without any losses. (TL 6)

CO-PO matrices of courses selected in above subjects (six matrices to be mentioned; one per semester from 3rd to 8th semester)

Having formulated the course outcomes, the next step is to match each CO of a course with one or more PO. The subject faculty matches the course outcomes after thoroughly understanding the program outcomes. Based on the relevancy between CO and PO, each PO is given correlation level as high (3) or moderate (2) or slight (1). CO-PO matrices are reviewed by the department academic committee before finalization. The same procedure is followed for CO-PSO matrices.

The following tables show the CO-PO and CO-PSO matrices for a selected course from 3rd to 8th semester of 2017-2018 academic year.

CAY 2017-18

Table 2.6.2.7 Metallurgy and material science **Year & Sem:** II-I

S.No	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C214.1	2	3		2	2	1	2					3
2	C214.2	3	3		2	2	1	2					3
3	C214.3	2	3		2	2	1	2					3
4	C214.4	2	3		2	2	1	2					3
5	C214.5	2	3		2	2	1	2					3
6	C214.6	2	3		2	2	1	2					3

Table 2.6.2.8 Mechanics of Fluids and Hydraulic Machines **Year & Sem:** II-II

S.No	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C222.1	3	2										
2	C222.2	3	2	1									
3	C222.3	3	2		2								
4	C222.4	3	2			1							
5	C222.5	3	2	1									
6	C222.6	3	2										

Table 2.6.2.9 Machine Tool **Year & Sem:** III-I

S.No	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C 314.1	2	2	2									
2	C 314.2		3										
3	C 314.3		3										
4	C 314.4												
5	C 314.5	2	3	2									
6	C314.6		3										

Table2.6.2.10: Refrigeration & Air Conditioning **Year & Sem:** III-II

S.No	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C323.1	2	2	1	1	2	1	1	1	1		1	1
2	C323.2	1	2	1	1	2	1	1	1			1	1
3	C323.3	1	1	1	1	1	1	1					1
4	C323.4	3	3	3	2	2	1	1	1	1		1	1
5	C323.5	3	3	3	3	3	1	1	1	1		1	1
6	C323.6	2	2	2	2	3	1	1	1	1		1	1

Table 2.6.2.11: Power Plant Engineering **Year & Sem:** IV-I

S. No.	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C412.1						3	3	3	2	1	1	1
2	C412.2	2	3	3	3	3	3	3		2	1	1	1
3	C412.3	3	3	3	3	3	3	3		2	1	1	1
4	C412.4					3	3	3	3	2		1	1
5	C412.5	3	3	2	2	2	3	3	1	2			1
6	C412.6	3	3	3	3	2	3	3	1	2		1	1

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9-39, Sy.No: 107, Tattiannaram (V),
Ghatkesar, Bandlaguda, Nagole, Hyd-68.

Table 2.6.2.12: Renewable Energy Sources **Year & Sem:** IV-II

S.No	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	**C426.1**	2	-	2	1	-	1	1	-	-	-	-	1
2	**C426.2**	2	-	2	1	-	-	1	-	-	-	-	1
3	**C426.3**	2	-	2	1	-	1	1	-	-	-	-	1
4	**C426.4**	2	-	2	1	-	-	1	-	-	-	-	1
5	**C426.5**	2	-	2	1	-	1	1	-	-	-	-	1
6	**C426.6**	2	-	2	1	-	-	-	-	-	-	1	1

CO-PSO matrices of courses (six matrices to be mentioned; one per semester from 3rd to 8th semester for CAY 2017-2018)

CAY 2017-2018

Table 2.6.2.13: Metallurgy and material science **Year & Sem:** II-I

S.No	CO	PSO1	PSO2
1	**C214.1**	2	2
2	**C214.2**	2	2
3	**C214.3**	2	2
4	**C214.4**	2	2
5	**C214.5**	2	2
6	**C214.6**	2	2

Table 2.6.2.14: Mechanics of Fluids and Hydraulic Machines **Year & Sem:** II-II

S.No	CO	PSO1	PSO2
1	**C222.1**	-	-
2	**C222.2**	-	-
3	**C222.3**	-	-
4	**C222.4**	-	-
5	**C222.5**	-	-
6	**C222.6**	-	-

Table 2.6.2.15: Machine Tool **Year & Sem:** III-I

S.No	CO	PSO1	PSO2
1	**C 314.1**		**2**
2	**C 314.2**		**2**
3	**C 314.3**		**2**
4	**C 314.4**		**2**
5	**C 314.5**		
6	**C314.6**		**2**

Table 2.6.2.16 Refrigeration & Air Conditioning **Year & Sem:** III-II

S.No	CO	PSO1	PSO2
1	**C323.1**	1	1
2	**C323.2**	1	1
3	**C323.3**	1	1
4	**C323.4**	1	1
5	**C323.5**	1	1
6	**C323.6**	1	1

Table 2.6.2.17 Power Plant Engineering **Year & Sem:** IV-I

S.No	CO	PSO1	PSO2
1	**C412.1**		1
2	**C412.2**	1	2
3	**C412.3**	1	2
4	**C412.4**		
5	**C412.5**	3	2
6	**C412.6**	3	2

Table 2.6.2.18: Renewable Energy Sources **Year & Sem:** IV-II

S. No.	CO	PSO1	PSO2
1	**C426.1**		1
2	**C426.2**		1
3	**C426.3**		1
4	**C426.4**		1
5	**C426.5**		1
6	**C426.6**		1

. Program level Course-PO matrix of all courses including first year courses

From the above tables i.e. the mapping matrices of COs with POs and PSOs program level course – PO and PSO matrices are formulated. These matrices consist of the normalised values (on a scale of 0 to 3) of sum of all COs for each PO and PSO for all courses in the program.

Table 2.6.2.19 PO Level for all courses Batch: 2012-2016

S. No	Course code/ Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C101 English	-	-	-	-	-	-	-	-	-	2.6	-	-
2	C102 Mathematics-I	2.2	1.8	1.8	1.5	-	-	-	-	-	-	-	-
3	C103 Engineering Mechanics	3	2.2	1.4	1.6	1.5	-	-	-	-	-	-	-
4	C104 Engineering Physics	3.0	3.0	2.0	2.0	2.0	-	-	-	-	-	-	-
5	C105 Engineering Chemistry	1.5	1.5	1.3	1.0	1.7	-	-	-	-	-	-	-
6	C106 Computer Programming	2	2.2	1	1	1.25	-	-	-	-	-	-	-
7	C107 Engineering Drawing	2.3	-	-	1.5	1.2	-	-	-	-	-	-	-
8	C108 Computer Programming Lab	3	2.6	1	1	1.25	-	-	-	-	-	-	-

9	C109 Engineering Physics and Chemistry Lab	1.8	2.0	2.0	1.4	1.0	-	-	-	-	-	-	-
10	C1010 English Language Communications Skills Lab	-	-	-	-	-	-	-	-	-	2.2	-	-
11	C1011 IT/ Engineering Workshop	1.8	2.0	2.0	1.4	1.0	-	-	-	-	-	-	-
12	C211 Environmental Studies	1.0	1.0	1.0	1.0	2.0	1.0	1.7	-	-	-	-	-
13	C212 Probability & Statistics	1.6	1.0	1.0	1.3	1.0	-	-	-	-	-	-	-
14	C213 Electrical & Electronics Engg.	2.7	2.5	1.0	2.7	2.0	-	-	-	-	-	-	-
15	C214 Mechanics of Solids	3.0	3.0	2.4	-	-	-	-	-	-	-	-	-
16	C215 Thermodynamics	1.0	1.8	1.6	2.0	1.0	1.8	2.5	-	-	-	2.0	1.0
17	C216 Metallurgy and Material Science	2.2	3.0	-	2.0	2.0	1.0	2.0	-	-	-	-	3.0
18	C217 Electrical & Electronics Engg. Lab	3.0	1.0	2.0	3.0	-	-	-	-	2.0	-	-	-
19	C218 Metallurgy & Mechanics of Solids lab	2.2	2.0	2.7	2.0	2.5	-	-	-	-	-	-	-
20	C221 Production Technology	2.8	3.0	1.0	2.2	3.0	1.0	2.0	-	-	-	-	3.0
21	C222 Kinematics of Machinery	2.4	1.4	1.0	1.5	1.6	-	-	-	-	-	-	-
22	C223 Applied Thermodynamics I	3.0	1.4	1.0	1.2	2.0	-	-	-	-	-	-	-
23	C224 Mechanics of Fluids and	3.0	2.0	1.0	2.0	1.0	-	-	-	-	-	-	-

	Hydraulic Machines												
24	C225 Machine Drawing	1.5	1.0	-	-	-	-	-	-	1.8	1.5	-	-
25	C226 Numerical Methods	1.4	1.0	1.0	1.3	-	-	-	-	-	-	-	-
26	C227 Production Technology lab	-	-	1.0	1.0	2.0	-	-	-	-	-	-	-
27	C228 Mechanics of Fluids and Hydraulic Machines lab	2.0	2.0	1.0	1.0	1.0	-	-	-	-	-	-	-
28	C311 Managerial Economics and Financial Analysis	2.8	3.0	1.0	2.2	3.0	-	-	-	-	-	1.0	-
29	C312 Engineering Metrology	2.6	1.2	1.0	1.2	1.8	-	-	-	-	-	-	-
30	C313 Dynamics of Machinery	3.0	2.0	2.0	1.8	2.0	-	-	-	-	-	-	-
31	C314 Machine Tools	2.0	2.8	2.0	-	-	-	-	-	-	-	-	-
32	C315 Design of machine Members-I	2.0	2.0	2.0	2.0	2.0	-	-	-	-	-	-	-
33	C316 Applied Thermodynamics II	-	1.2	1.2	1.0	1.0	1.8	1.2	-	-	-	-	1.0
34	C317 Thermal Engineering Lab	3.0	-	3.0	-	-	-	2.0	-	2.0	-	-	-
35	C318 Machine Tools & Metrology Lab	3.0	1.2	1.0	3.0	1.0	-	-	-	2.0	-	-	-
36	C321 Automobile Engineering	2.4	1.0	2.3	1.7	1.3	3.0	3.0	2.0	-	-	-	1.5
37	C322 Finite Element Methods	3.0	3.0	-	2.0	1.0	-	-	-	-	-	-	-
38	C323 Refrigeration & Air conditioning	2.0	2.2	1.8	1.6	2.2	1.0	1.0	1.0	1.0	-	-	-

39	C324 Design of Machine members-II	2.2	2.2	2.2	2.0	2.2	-	-	-	-	-	-	-
40	C325 Heat Transfer	2.6	1.8	1.3	1.3	1.0	-	-	1.0	-	-	-	1.0
41	C326 Industrial Management	-	-	-	-	-	1.0	-	3.0	-	1.0	1.0	-
42	C327 Heat Transfer Lab	2.8	2.4	1.0	1.0	1.0	-	-	-	-	-	-	-
43	C328 Advanced Communication Skills	-	-	-	-	-	-	-	-	-	3.0	-	-
44	C411 Operations Research	3.0	2.4	2.6	2.4	2.0	-	-	-	-	-	-	-
45	C412 Power plant Engineering	2.8	3.0	2.8	2.8	2.5	3.0	3.0	2.0	2.0	1.0	1.0	1.0
46	C413 CAD/CAM	2.6	2.8	1.0	1.8	2.6	1.0	2.8	1.0	3.0	1.6	2.0	3.0
47	C414 ICS	2.8	2.8	1.0	2.0	2.6	1.0	2.6	1.0	1.0	-	-	2.0
48	C415 Robotics	3.0	2.0	1.3	2.3	1.5	1.0	-	1.0	-	-	-	1.0
49	C416 UCMP	1.6	2.4	1.6	1.6	-	-	-	-	-	-	-	-
50	C417 Cad & Manufacturing Lab	2.5	2.0	1.0	2.0	1.8	1.0	1.0	2.0	1.8	1.0	-	-
51	C418 Production Drawing Practice & Instrumentation Lab	1.6	1.2	1.0	1.5	1.3	-	-	-	-	1.7	1.3	1.0
52	C421 Production Planning and Control	1.6	2.5	2.3	2.0	-	-	-	-	-	-	-	-
53	C422 Plant Layout and Material Handling	1.2	1.6	2.0	2.0	1.8	-	-	-	-	-	-	-
54	C423	2.0	-	2.0	1.0	-	1.0	1.0	-	-	-	1.0	1.0

	Renewable Energy Sources												
55	C424 Mini Project	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
56	C425 Seminar	2.0	2.0	2.0	2.0	1.0	2.0	1.0	-	2.0	2.0	2.0	3.0
57	C426 Project Work	3.0	2.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0
58	C427 Comprehensive Viva	3.0	3.0	2.0	3.0	3.0	-	2.0	-	-	-	2.0	3.0

Table 2.6.2.20 PO Level for all courses Batch: 2013-2017

S. No	Course code/ Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C101 English	-	-	-	-	-	-	-	-	-	2.6	-	-
2	C102 Mathematics-I	2.2	1.8	1.8	1.5	-	-	-	-	-	-	-	-
3	C103 Engineering Mechanics	3	2.2	1.4	1.6	1.5	-	-	-	-	-	-	-
4	C104 Engineering Physics	3.0	3.0	2.0	2.0	2.0	-	-	-	-	-	-	-
5	C105 Engineering Chemistry	1.5	1.5	1.3	1.0	1.7	-	-	-	-	-	-	-
6	C106 Computer Programming	2	2.2	1	1	1.25	-	-	-	-	-	-	-
7	C107 Engineering Drawing	2.3	-	-	1.5	1.2	-	-	-	-	-	-	-
8	C108 Computer Programming Lab	3	2.6	1	1	1.25	-	-	-	-	-	-	-
9	C109 Engineering Physics and Chemistry Lab	1.8	2.0	2.0	1.4	1.0	-	-	-	-	-	-	-

10	C1010 English Language Communications Skills Lab	-	-	-	-	-	-	-	-	-	2.2	-	-
11	C1011 IT/ Engineering Workshop	1.8	2.0	2.0	1.4	1.0	-	-	-	-	-	-	-
12	C211 Environmental Studies	1.0	1.0	1.0	1.0	2.0	1.0	1.7	-	-	-	-	-
13	C212 Probability & Statistics	1.6	1.0	1.0	1.3	1.0	-	-	-	-	-	-	-
14	C213 Electrical & Electronics Engg.	2.7	2.5	1.0	2.7	2.0	-	-	-	-	-	-	-
15	C214 Mechanics of Solids	3.0	3.0	2.4	-	-	-	-	-	-	-	-	-
16	C215 Thermodynamics	1.0	1.8	1.6	2.0	1.0	1.8	2.5	-	-	-	2.0	1.0
17	C216 Metallurgy and Material Science	2.2	3.0	-	2.0	2.0	1.0	2.0	-	-	-	-	3.0
18	C217 Electrical & Electronics Engg. Lab	3.0	1.0	2.0	3.0	-	-	-	-	2.0	-	-	-
19	C218 Metallurgy & Mechanics of Solids lab	2.2	2.0	2.7	2.0	2.5	-	-	-	-	-	-	-
20	C221 Production Technology	2.8	3.0	1.0	2.2	3.0	1.0	2.0	-	-	-	-	3.0
21	C222 Kinematics of Machinery	2.4	1.4	1.0	1.5	1.6	-	-	-	-	-	-	-
22	C223	3.0	1.4	1.0	1.2	2.0	-	-	-	-	-	-	-

	Thermal Engineering - I												
23	C224 Mechanics of Fluids and Hydraulic Machines	3.0	2.0	1.0	2.0	1.0	-	-	-	-	-	-	-
24	C225 Machine Drawing	1.5	1.0	-	-	-	-	-	-	1.8	1.5	-	-
25	C226 Mathematics-II	1.4	1.0	1.0	1.3	-	-	-	-	-	-	-	-
26	C227 Production Technology lab	-	-	1.0	1.0	2.0	-	-	-	-	-	-	-
27	C228 Mechanics of Fluids and Hydraulic Machines lab	2.0	2.0	1.0	1.0	1.0	-	-	-	-	-	-	-
28	C311 Managerial Economics and Financial Analysis	2.8	3.0	1.0	2.2	3.0	-	-	-	-	-	1.0	-
29	C312 Engineering Metrology	2.6	1.2	1.0	1.2	1.8	-	-	-	-	-	-	-
30	C313 Dynamics of Machinery	3.0	2.0	2.0	1.8	2.0	-	-	-	-	-	-	-
31	C314 Machine Tools	2.0	2.8	2.0	-	-	-	-	-	-	-	-	-
32	C315 Design of machine Members-I	2.0	2.0	2.0	2.0	2.0	-	-	-	-	-	-	-
33	C316 Thermal Engineering-II	-	1.2	1.2	1.0	1.0	1.8	1.2	-	-	-	-	1.0
34	C317 Thermal Engineering Lab	3.0	-	3.0	-	-	-	2.0	-	2.0	-	-	-

35	C318 Machine Tools & Metrology Lab	3.0	1.2	1.0	3.0	1.0	-	-	-	2.0	-	-	-
36	C321 Automobile Engineering	2.4	1.0	2.3	1.7	1.3	3.0	3.0	2.0	-	-	-	1.5
37	C322 Finite Element Methods	3.0	3.0	-	2.0	1.0	-	-	-	-	-	-	-
38	C323 Refrigeration & Air conditioning	2.0	2.2	1.8	1.6	2.2	1.0	1.0	1.0	1.0	-	1.0	1.0
39	C324 Design of Machine members-II	2.2	2.2	2.2	2.0	2.2	-	-	-	-	-	-	-
40	C325 Heat Transfer	2.6	1.8	1.3	1.3	1.0	-	-	1.0	-	-	-	1.0
41	C326 Intellectual Property Rights	-	-	-	-	-	1.0	-	3.0	-	1.0	1.0	-
42	C327 Heat Transfer Lab	2.8	2.4	1.0	1.0	1.0	-	-	-	-	-	-	-
43	C328 Advanced Communication Skills	-	-	-	-	-	-	-	-	-	3.0	-	-
44	C411 Operations Research	3.0	2.4	2.6	2.4	2.0	-	-	-	-	-	-	-
45	C412 Power plant Engineering	2.8	3.0	2.8	2.8	2.5	3.0	3.0	2.0	2.0	1.0	1.0	1.0
46	C413 CAD/CAM	2.6	2.8	1.0	1.8	2.6	1.0	2.8	1.0	3.0	1.6	2.0	3.0
47	C414 ICS	2.8	2.8	1.0	2.0	2.6	1.0	2.6	1.0	1.0	-	-	2.0
48	C415 Robotics	3.0	2.0	1.3	2.3	1.5	1.0	-	1.0	-	-	-	1.0
49	C416	1.6	2.4	1.6	1.6	-	-	-	-	-	-	-	-

	UCMP												
50	C417 Cad & Manufacturing Lab	2.5	2.0	1.0	2.0	1.8	1.0	1.0	2.0	1.8	1.0	-	-
51	C418 Production Drawing Practice & Instrumentation Lab	1.6	1.2	1.0	1.5	1.3	-	-	-	-	1.7	1.3	1.0
52	C421 Production Planning and Control	1.6	2.5	2.3	2.0	-	-	-	-	-	-	-	-
53	C422 Plant Layout and Material Handling	1.2	1.6	2.0	2.0	1.8	-	-	-	-	-	-	-
54	C423 Renewable Energy Sources	2.0	-	2.0	1.0	-	1.0	1.0	-	-	-	1.0	1.0
55	C424 Mini Project	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
56	C425 Seminar	2.0	2.0	2.0	2.0	1.0	2.0	1.0	-	2.0	2.0	2.0	3.0
57	C426 Project Work	3.0	2.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	3.0	3.0	3.0
58	C427 Comprehensive Viva	3.0	3.0	2.0	3.0	3.0	-	2.0	-	-	-	2.0	3.0

Table 2.6.2.21 PO Level for all courses Batch: 2014-2018

S. No	Course code/ Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C101 English	-	-	-	-	-	-	-	-	-	2.6	-	-
2	C102 Mathematics-I	2.2	1.8	1.8	1.5	-	-	-	-	-	-	-	-
3	C103 Engineering Mechanics	3	2.2	1.4	1.6	1.5	-	-	-	-	-	-	-
4	C104 Engineering Physics	3.0	3.0	2.0	2.0	2.0	-	-	-	-	-	-	-

5	C105 Engineering Chemistry	1.5	1.5	1.3	1.0	1.7	-	-	-	-	-	-	-
6	C106 Computer Programming	2	2.2	1	1	1.25	-	-	-	-	-	-	-
7	C107 Engineering Drawing	2.3	-	-	1.5	1.2	-	-	-	-	-	-	-
8	C108 Computer Programming Lab	3	2.6	1	1	1.25	-	-	-	-	-	-	-
9	C109 Engineering Physics and Chemistry Lab	1.8	2.0	2.0	1.4	1.0	-	-	-	-	-	-	-
10	C1010 English Language Communications Skills Lab	-	-	-	-	-	-	-	-	-	2.2	-	-
11	C1011 IT/ Engineering Workshop	1.8	2.0	2.0	1.4	1.0	-	-	-	-	-	-	-
12	C211 Environmental Studies	1.0	1.0	1.0	1.0	2.0	1.0	1.7	-	-	-	-	-
13	C212 Probability & Statistics	1.6	1.0	1.0	1.3	1.0	-	-	-	-	-	-	-
14	C213 Electrical & Electronics Engg.	2.7	2.5	1.0	2.7	2.0	-	-	-	-	-	-	-
15	C214 Mechanics of Solids	3.0	3.0	2.4	-	-	-	-	-	-	-	-	-
16	C215 Thermodynamics	1.0	1.8	1.6	2.0	1.0	1.8	2.5	-	-	-	2.0	1.0
17	C216 Metallurgy and Material Science	2.2	3.0	-	2.0	2.0	1.0	2.0	-	-	-	-	3.0
18	C217 Electrical & Electronics Engg. Lab	3.0	1.0	2.0	3.0	-	-	-	-	2.0	-	-	-
19	C218 Metallurgy & Mechanics of Solids lab	2.2	2.0	2.7	2.0	2.5	-	-	-	-	-	-	-
20	C221 Production Technology	2.8	3.0	1.0	2.2	3.0	1.0	2.0	-	-	-	-	-
21	C222	2.4	1.4	1.0	1.5	1.6	-	-	-	-	-	-	-

	Kinematics of Machinery												
22	C223 Thermal Engineering - I	3.0	1.4	1.0	1.2	2.0	-	-	-	-	-	-	-
23	C224 Mechanics of Fluids and Hydraulic Machines	3.0	2.0	1.0	2.0	1.0	-	-	-	-	-	-	-
24	C225 Machine Drawing	1.5	1.0	-	-	-	-	-	-	1.8	1.5	-	-
25	C226 Mathematics-II	1.4	1.0	1.0	1.3	-	-	-	-	-	-	-	-
26	C227 Production Technology lab	-	-	1.0	1.0	2.0	-	-	-	-	-	-	-
27	C228 Mechanics of Fluids and Hydraulic Machines lab	2.0	2.0	1.0	1.0	1.0	-	-	-	-	-	-	-
28	C311 Managerial Economics and Financial Analysis	2.8	3.0	1.0	2.2	3.0	-	-	-	-	-	1.0	-
29	C312 Engineering Metrology	2.6	1.2	1.0	1.2	1.8	-	-	-	-	-	-	-
30	C313 Dynamics of Machinery	3.0	2.0	2.0	1.8	2.0	-	-	-	-	-	-	-
31	C314 Machine Tools	2.0	2.8	2.0	-	-	-	-	-	-	-	-	-
32	C315 Design of machine Members-I	2.0	2.0	2.0	2.0	2.0	-	-	-	-	-	-	-
33	C316 Thermal Engineering-II	-	1.2	1.2	1.0	1.0	1.8	1.2	-	-	-	-	1.0
34	C317 Thermal Engineering Lab	3.0	-	3.0	-	-	-	2.0	-	2.0	-	-	-
35	C318 Machine Tools & Metrology Lab	3.0	1.2	1.0	3.0	1.0	-	-	-	2.0	-	-	-
36	C321 Automobile Engineering	2.4	1.0	2.3	1.7	1.3	3.0	3.0	2.0	-	-	-	1.5
37	C322 Finite Element Methods	3.0	3.0	-	2.0	1.0	-	-	-	-	-	-	-
38	C323	2.0	2.2	1.8	1.6	2.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0

	Refrigeration & Air conditioning												
39	C324 Design of Machine members-II	2.2	2.2	2.2	2.0	2.2	-	-	-	-	-	-	-
40	C325 Heat Transfer	2.6	1.8	1.3	1.3	1.0	-	-	1.0	-	-	-	1.0
41	C326 Human Value & Professional Ethics	-	-	-	-	-	1.0	-	3.0	-	1.0	1.0	-
42	C327 Heat Transfer Lab	2.8	2.4	1.0	1.0	1.0	-	-	-	-	-	-	-
43	C328 Advanced Communication Skills	-	-	-	-	-	-	-	-	-	3.0	-	-
44	C411 Operations Research	3	3	3	3	3	-	-	-	-	-	-	-
45	C412 Power plant Engineering	2	3	2	2	3	3	3	2	3	1	2	2
46	C413 CAD/CAM	3	3	2	2	3	2	3	2	3	2	2	3
47	C414 ICS	3	3	2	2	3	1	3	2	1	-	-	3
48	C415 Robotics	3	2	2	3	2	1	-	1	-	-	-	1
49	C416 UCMP	2	3	2	2	-	-	-	-	-	-	-	-
50	C417 Cad & Manufacturing Lab	3	3	2	3	2	2	2	3	2	2	-	-
51	C418 Production Drawing Practice & Instrumentation Lab	2	2	1	1	2	-	-	-	-	2	2	1
52	C421 Production Planning and Control	2	3	2	2	-	-	-	-	-	-	-	-
53	C422 Plant Layout and Material Handling	2	2	3	3	2	2	-	-	-	-	-	-

54	C423 Renewable Energy Sources	3	-	3	2	-	1	2	-	-	-	1	2
55	C424 Mini Project	3	3	3	3	3	3	3	3	3	3	3	3
56	C425 Seminar	2	2	2	2	1	2	1	-	2	2	2	3
57	C426 Project Work	3	2	3	3	3	3	3	2	3	3	3	3
58	C427 Comprehensive Viva	3	3	2	3	3	-	2	-	-	-	2	3

Table 2.6.2.22 PSO Level for all courses Batch: 2012-2016

S. No	Course code/ Course title	PSO1	PSO2
1	C101 English	-	-
2	C102 Mathematics-I	-	-
3	C103 Engineering Mechanics	-	-
4	C104 Engineering Physics	-	-
5	C105 Engineering Chemistry	-	-
6	C106 Computer Programming	-	-
7	C107 Engineering Drawing	3.0	-
8	C108 Computer Programming Lab	-	-
9	C109 Engineering Physics and Chemistry Lab	-	-
10	C1010 English Language Communications Skills Lab	-	-
11	C1011 IT/ Engineering Workshop	-	1.4
12	C211 Environmental Studies	-	-
13	C212 Probability & Statistics	-	-
14	C213		

	Electrical & Electronics Engg.		
15	C214 Mechanics of Solids	2.0	2.0
16	C215 Thermodynamics	1.2	1.0
17	C216 Metallurgy and Material Science	2.0	2.0
18	C217 Electrical & Electronics Engg. Lab	-	-
19	C218 Metallurgy & Mechanics of Solids lab	-	2.5
20	C221 Production Technology	3.0	3.0
21	C222 Kinematics of Machinery	-	1.5
22	C223 Applied Thermodynamics I	-	-
23	C224 Mechanics of Fluids and Hydraulic Machines	-	-
24	C225 Machine Drawing	-	-
25	C226 Numerical Methods	-	-
26	C227 Production Technology lab	-	3.0
27	C228 Mechanics of Fluids and Hydraulic Machines lab	-	-
28	C311 Managerial Economics and Financial Analysis	-	-
29	C312 Engineering Metrology	-	-
30	C313 Dynamics of Machinery	-	1.6
31	C314 Machine Tools	-	2.0
32	C315 Design of machine Members-I	-	3.0
33	C316 Applied Thermodynamics II	-	1.0
34	C317 Thermal Engineering Lab	-	-
35	C318 Machine Tools & Metrology Lab	-	2.0
36	C321	-	1.0

	Automobile Engineering		
37	C322 Finite Element Methods	-	-
38	C323 Refrigeration & Air conditioning	1.0	1.0
39	C324 Design of Machine members-II	-	3.0
40	C325 Heat Transfer	-	-
41	C326 Industrial Management	-	-
42	C327 Heat Transfer Lab	-	-
43	C328 Advanced Communication Skills	-	-
44	C411 Operations Research	-	-
45	C412 Power plant Engineering	2.0	1.8
46	C413 CAD/CAM	1.8	1.5
47	C414 ICS	1.8	1.0
48	C415 Robotics	1.7	2.0
49	C416 UCMP	-	1.8
50	C417 Cad & Manufacturing Lab	3.0	3.0
51	C418 Production Drawing Practice & Instrumentation Lab	-	1.0
52	C421 Production Planning and Control	-	-
53	C422 Plant Layout and Material Handling	-	1.8
54	C423 Renewable Energy Sources	-	1.0
55	C424 Mini Project	3.0	3.0
56	C425 Seminar	2.0	2.0
57	C426 Project Work	2.0	3.0
58	C427	2.0	3.0

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	Comprehensive Viva		

Table 2.6.2.23 PSO Level for all courses Batch: 2013-2017

S. No	Course code/ Course title	PSO1	PSO2
1	C101 English	-	-
2	C102 Mathematics-I	-	-
3	C103 Engineering Mechanics	-	-
4	C104 Engineering Physics	-	-
5	C105 Engineering Chemistry	-	-
6	C106 Computer Programming	-	-
7	C107 Engineering Drawing	3.0	-
8	C108 Computer Programming Lab	-	-
9	C109 Engineering Physics and Chemistry Lab	-	-
10	C1010 English Language Communications Skills Lab	-	-
11	C1011 IT/ Engineering Workshop	-	1.4
12	C211 Environmental Studies	-	-
13	C212 Probability & Statistics	-	-
14	C213 Electrical & Electronics Engg.	-	-
15	C214 Mechanics of Solids	2.0	2.0
16	C215 Thermodynamics	1.2	1.0
17	C216 Metallurgy and Material Science	2.0	2.0
18	C217	-	-

	Electrical & Electronics Engg. Lab		
19	C218 Metallurgy & Mechanics of Solids lab	-	2.5
20	C221 Production Technology	3.0	3.0
21	C222 Kinematics of Machinery	-	1.5
22	C223 Thermal Engineering - I	-	-
23	C224 Mechanics of Fluids and Hydraulic Machines	-	-
24	C225 Machine Drawing	-	-
25	C226 Mathematics-II	-	-
26	C227 Production Technology lab	-	3.0
27	C228 Mechanics of Fluids and Hydraulic Machines lab	-	-
28	C311 Managerial Economics and Financial Analysis	-	-
29	C312 Engineering Metrology	-	-
30	C313 Dynamics of Machinery	-	1.6
31	C314 Machine Tools	-	2.0
32	C315 Design of machine Members-I	-	3.0
33	C316 Thermal Engineering-II	-	1.0
34	C317 Thermal Engineering Lab	-	-
35	C318 Machine Tools & Metrology Lab	-	2.0
36	C321 Automobile Engineering	-	1.0
37	C322 Finite Element Methods	-	-
38	C323 Refrigeration & Air conditioning	1.0	1.0
39	C324 Design of Machine members-II	-	3.0
40	C325	-	-

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	Heat Transfer		
41	C326 Intellectual Property Rights	-	-
42	C327 Heat Transfer Lab	-	-
43	C328 Advanced Communication Skills	-	-
44	C411 Operations Research	-	-
45	C412 Power plant Engineering	2.0	1.8
46	C413 CAD/CAM	1.8	1.5
47	C414 ICS	1.8	1.0
48	C415 Robotics	1.7	2.0
49	C416 UCMP	-	1.8
50	C417 Cad & Manufacturing Lab	3.0	3.0
51	C418 Production Drawing Practice & Instrumentation Lab	-	1.0
52	C421 Production Planning and Control	-	-
53	C422 Plant Layout and Material Handling	-	1.8
54	C423 Renewable Energy Sources	-	1.0
55	C424 Mini Project	3.0	3.0
56	C425 Seminar	2.0	2.0
57	C426 Project Work	2.0	3.0
58	C427 Comprehensive Viva	2.0	3.0

Table 2.6.2.24 PSO Level for all courses Batch: 2014-2018

S. No	Course code/ Course title	PSO1	PSO2
1	C101 English	-	-
2	C102 Mathematics-I	-	-
3	C103 Engineering Mechanics	-	-
4	C104 Engineering Physics	-	-
5	C105 Engineering Chemistry	-	-
6	C106 Computer Programming	-	-
7	C107 Engineering Drawing	3.0	-
8	C108 Computer Programming Lab	-	-
9	C109 Engineering Physics and Chemistry Lab	-	-
10	C1010 English Language Communications Skills Lab	-	-
11	C1011 IT/ Engineering Workshop	-	1.4
12	C211 Environmental Studies	-	-
13	C212 Probability & Statistics	-	-
14	C213 Electrical & Electronics Engg.	-	-
15	C214 Mechanics of Solids	2.0	2.0
16	C215 Thermodynamics	1.2	1.0
17	C216 Metallurgy and Material Science	2.0	2.0
18	C217 Electrical & Electronics Engg. Lab	-	-
19	C218 Metallurgy & Mechanics of Solids lab	-	2.5
20	C221 Production Technology	3.0	3.0
21	C222		1.5

	Kinematics of Machinery		
22	C223 Thermal Engineering - I	-	-
23	C224 Mechanics of Fluids and Hydraulic Machines	-	-
24	C225 Machine Drawing	-	-
25	C226 Mathematics-II	-	-
26	C227 Production Technology lab	-	3.0
27	C228 Mechanics of Fluids and Hydraulic Machines lab	-	-
28	C311 Managerial Economics and Financial Analysis	-	-
29	C312 Engineering Metrology	-	-
30	C313 Dynamics of Machinery	-	1.6
31	C314 Machine Tools	-	2.0
32	C315 Design of machine Members-I	-	3.0
33	C316 Thermal Engineering-II	-	1.0
34	C317 Thermal Engineering Lab	-	-
35	C318 Machine Tools & Metrology Lab	-	2.0
36	C321 Automobile Engineering	-	1.0
37	C322 Finite Element Methods	-	-
38	C323 Refrigeration & Air conditioning	1.0	1.0
39	C324 Design of Machine members-II	-	3.0
40	C325 Heat Transfer	-	-
41	C326 Human Values and Professional Ethics	-	-
42	C327 Heat Transfer Lab	-	-
43	C328		

	Advanced Communication Skills		
44	C411 Operations Research	-	-
45	C412 Power plant Engineering	2	2
46	C413 CAD/CAM	2	2
47	C414 ICS	2	2
48	C415 Robotics	2	2
49	C416 UCMP	-	3
50	C417 Cad & Manufacturing Lab	3	3
51	C418 Production Drawing Practice & Instrumentation Lab	-	2
52	C421 Production Planning and Control	-	-
53	C422 Plant Layout and Material Handling	-	2
54	C423 Renewable Energy Sources	-	2
55	C424 Mini Project	3	3
56	C425 Seminar	2	2
57	C426 Project Work	2	3
58	C427 Comprehensive Viva	2	3

Attainment of Course Outcomes

Describe the assessment processes used to gather the data upon which the evaluation of Course Outcome is based

The attainment of Course Outcomes is evaluated by collecting the data from the following assessments:

a) Performance of the students in the mid (i.e. internal) examinations (both theory and laboratory courses).

b) Performance of the students in the University examinations (both theory and laboratory courses).
c) Performance of the students in the Industrial oriented mini project and Project work.
d) Performance of the students in the Seminar and comprehensive viva.

a) Internal Examinations:

Theory:

Two mid examinations are conducted for each course.
The mid examination consists of three parts,

Descriptive paper set by the course faculty which is evaluated for maximum marks of 10; objective paper set by the university is evaluated for maximum marks of 10 and assignments, given by course faculty are evaluated for maximum of 5 marks.

For each mid examination, each question of the descriptive part is mapped with a particular CO of the course and there will be at least one question for each of the CO's in either of the mid examinations.

The question wise marks obtained by the students in each mid examination (Descriptive part) and marks obtained in the objective, assignments are used to evaluate the attainment of CO's.

Laboratory:

Two mid examinations are conducted for each laboratory course. Each mid examination is evaluated for maximum marks of 25 marks. These marks are distributed among Day to day performance (5 marks), record/observation (5 marks), viva (5 marks) and write up (10 marks).

The marks obtained by the students in each mid examination are used to evaluate the CO attainment.

b) University examinations:

The university examinations are conducted for 75 marks (theory courses) and for 50 marks (laboratory courses).

The marks obtained by the students in each course in the university examinations and also considering the performance of mid examinations, the overall CO attainment level is computed.

c) Project work and industry oriented mini project:

The project work is evaluated for 200 marks out of which 50 marks for internal evaluation and 150 marks for university examinations. The evaluation for internal marks of 50 is based on rubrics formulated for the project work by the project review committee appointed by the head of the department. The evaluation for 150 marks of University exam is based on the assessment by an external examiner appointed by the university.

Industry oriented mini project is evaluated for maximum of 50 marks by the external examiner.

The attainment of CO is evaluated based on the marks obtained in the project work and industry oriented mini project.

d) Seminar and Comprehensive Viva:

The seminar is evaluated for a maximum of 50 marks (internal only) based on the rubrics formulated for the seminar by three member panel appointed by the head of the department.

The attainment of CO is evaluated based on the marks obtained in the seminar and comprehensive viva.

Record the attainment of Course Outcomes of all courses with respect to set attainment Levels

The following methodology is followed for evaluating the attainment of Course Outcomes for each academic year.

a) Theory course:

Mid examination:

Marks obtained by the students in the mid examination are entered in excel spreadsheet

Descriptive part:

Question wise marks are entered in the excel sheet. Based on the percentage of students scoring more than the threshold value, attainment for CO is obtained by following the set attainment levels. Attainment levels set for descriptive as follows:

Attainment Level 0: Less than 40% of students scoring more than 60% of marks out of the maximum marks.
Attainment Level 1: 40% to 50% of students scoring more than 60% of marks out of the maximum marks.
Attainment Level 2: 50% to 60% of students scoring more than 60% of marks out of the maximum marks.
Attainment Level 3: 60% and above students scoring more than 60% of marks out of the maximum marks.

Objective and Assignment parts:

Marks of objective, assignment are entered in the respective columns in the excel sheet. Based on the percentage of students scoring more than the threshold value, attainment for CO is obtained by the set attainment levels. Attainment levels set for objective and assignment is same as the descriptive part.

Maximum mark for objective part is 10. Hence, the threshold value is 6 (i.e. 60% of 10) for objective. Maximum mark for assignment part is 5. Hence, the threshold value is 3 (i.e. 60% of 5) for assignment.

Each CO attainment value is obtained by taking wieighted average of each part of mid based on their contribution of marks.

University examination:
As the mapping of questions to COs is not available for the university examinations, the attainment level of all the COs is taken as same based on the following levels.
Attainment Level 0: Less than 40% of students scoring more than 40% of marks out of the maximum marks.
Attainment Level 1: 40% to 50% of students scoring more than 40% of marks out of the maximum marks.
Attainment Level 2: 50% to 60% of students scoring more than 40% of marks out of the maximum marks.
Attainment Level 3: 60% and above students scoring more than 40% of marks out of the maximum marks.

Maximum mark for university examination (theory) is 75. Hence, the threshold value is 30 (i.e. 40% of 75).

Calculation of overall attainment of course outcomes for theory courses:
The weightage given for mid examination is 25% and for university examination is 75%.
Overall attainment of CO = (25% of CO attainment through mid examination) + (75% of CO attainment through university examination).

Example : Refrigeration and Air Conditioning (III year II semester) course.

Table 2.6.2.25 CO attainment through mid examination

Course Outcomes	Mid examination						Avg of Attainments
	% of students scored more than threshold			Attainment Level			
	Descriptive	Objective	Assignment	Descriptive	Objective	Assignment	
CO1	40.3	19.5	82.3	1	0	3	1
CO2	40.0	19.5	82.3	1	0	3	1
CO3	47.4	11.1	82.3	1	0	3	1
CO4	57.5	2.7	82.3	2	0	3	1.4
CO5	57.5	2.7	82.3	2	0	3	1.4
CO attainment through mid examination (i.e. average of all COs attainments)							**1.16**

CO attainment through university examination:
54% of students have scored more than the threshold, hence the attainment level is 2.

Table 2.6.2.26: **Overall CO attainment level:**

Course Outcomes	Internal Attainment	University Attainment	Overall Attainment
CO1	1	2	1.75
CO2	1	2	1.75
CO3	1	2	1.75
CO4	1.4	2	1.85
CO5	1.4	2	1.85

Overall attainment = (25% of CO attainment through mid examination) + (75% of CO attainment through university examination).

Overall Attainment for CO 1 = (1*0.25) + (2*0.75) = 1.75

b) Laboratory course:

Mid examination:
Based on the following levels CO attainment is obtained. Threshold value is 17.5 (i.e. 60% of 25).

Attainment Level 0: Less than 50% of students scoring more than 60% of marks out of the maximum marks.
Attainment Level 1: 50% to 60% of students scoring more than 60% of marks out of the maximum marks.
Attainment Level 2: 60% to 70% of students scoring more than 60% of marks out of the maximum marks.
Attainment Level 3: 70% and above students scoring more than 60% of marks out of the maximum mark.

University examination:

Based on the following levels CO attainment is obtained. Threshold value is 30 (i.e. 40% of 50).

Attainment Level 0: Less than 40% of students scoring more than 40% of marks out of the maximum marks
Attainment Level 1: 40% to 50% of students scoring more than 40% of marks out of the maximum marks.
Attainment Level 2: 50% to 60% of students scoring more than 40% of marks out of the maximum marks.
Attainment Level 3: 60% and above students scoring more than 40% of marks out of the maximum mark.

Calculation of overall attainment of course outcomes for laboratory course is same as the theory courses.

c) Project work:
Based on the following levels CO attainment is obtained. Threshold value is 90 (i.e. 60% of 150) for university assessment.

Attainment Level 0: Less than 50% of students scoring more than 60% of marks out of the maximum marks

Attainment Level 1: 50% to 60% of students scoring more than 60% of marks out of the maximum marks.
Attainment Level 2: 60% to 70% of students scoring more than 60% of marks out of the maximum marks.
Attainment Level 3: 70% and above students scoring more than 60% of marks out of the maximum mark.

Calculation of overall attainment of course outcomes for project is same as the theory & laboratory courses.

d) Industry oriented mini project, seminar and comprehensive viva:

Attainment levels followed for industry oriented mini project, seminar and comprehensive viva is same as that of project work. Threshold value for mini project is 30 (i.e. 60% of 50), seminar is 30 and for comprehensive viva is 60 (i.e. 60% of 100).

Following are the tables showing the attainment levels obtained for mid and university examination and also overall course outcome for each course in the program for all the three academic years.

Table 2.6.2.27 CO Attainments for all courses Batch: 2012-2016

S. No	Course code/ Course title	CO 1 (T)	CO 2 (T)	CO 3 (T)	CO 4 (T)	CO 5 (T)	CO 1 (A)	CO 2 (A)	CO 3 (A)	CO 4 (A)	CO 5 (A)
1	C101 English	1.6	1.6	1.6	1.6	1.6	2.55	2.80	2.80	2.85	2.75
2	C102 Mathematics-I	1	1	1	1	1	1.05	1.00	1.00	1.15	1.05
3	C103 Engineering Mechanics	1.1	1.1	1.1	1.1	1.1	1.75	1.85	1.75	2.00	2.10
4	C104 Engineering Physics	1.2	1.2	1.2	1.2	1.2	1.15	1.20	1.10	1.25	1.05
5	C105 Engineering Chemistry	1.1	1.1	1.1	1.1	1.1	2.55	2.70	2.50	2.55	2.45
6	C106 Computer Programming	1.2	1.2	1.2	1.2	1.2	1.75	1.75	1.75	1.80	1.70
7	C107 Engineering Drawing	1.2	1.2	1.2	1.2	1.2	2.15	2.15	2.05	2.00	1.90
8	C108	2	2	2	2	2	2.07	2.07	2.07	2.07	2.07

	Computer Programming Lab										
9	C109 Engineering Physics and Chemistry Lab	2.1	2.1	2.1	2.1	2.1	2.86	2.86	2.86	2.86	2.86
10	C1010 English Language Communications Skills Lab	2.1	2.1	2.1	2.1	2.1	3.00	3.00	3.00	3.00	3.00
11	C1011 IT/ Engineering Workshop	2.4	2.4	2.4	2.4	2.4	3.00	3.00	3.00	3.00	3.00
12	C211 Environmental Studies	1.5	1.5	1.5	1.5	1.5	2.45	2.35	2.45	2.35	2.35
13	C212 Probability & Statistics	1.4	1.4	1.4	1.4	1.4	2.20	2.15	2.10	2.05	2.05
14	C213 Electrical & Electronics Engg.	1.1	1.1	1.1	1.1	1.1	1.95	1.85	1.95	1.85	1.85
15	C214 Mechanics of Solids	1	1	1	1	1	2.70	2.60	2.70	2.60	2.60
16	C215 Thermodynamics	1	1	1	1	1	1.95	1.85	1.95	1.90	1.90
17	C216 Metallurgy and Material Science	1.4	1.4	1.4	1.4	1.4	2.70	2.60	2.70	2.65	2.65
18	C217 Electrical & Electronics Engg. Lab	1.7	1.7	1.7	1.7	1.7	2.93	2.93	2.93	2.93	2.93
19	C218 Metallurgy & Mechanics of Solids lab	1.9	1.9	1.9	1.9	1.9	3.00	3.00	3.00	3.00	3.00
20	C221 Production Technology	1.4	1.4	1.4	1.4	1.4	2.60	2.60	2.70	2.60	2.65
21	C222 Kinematics of Machinery	1.1	1.1	1.1	1.1	1.1	1.85	1.85	1.90	1.85	1.85
22	C223 Applied Thermodynamics I	1.6	1.6	1.6	1.6	1.6	1.95	1.95	1.95	1.95	1.95
23	C224 Mechanics of Fluids and Hydraulic Machines	1.5	1.5	1.5	1.5	1.5	1.25	1.15	1.25	1.15	1.15

24	C225 Machine Drawing	1.6	1.6	1.6	1.6	1.6	1.40	1.30	1.35	1.25	1.30
25	C226 Numerical Methods	1	1	1	1	1	2.75	2.70	2.85	2.85	2.80
26	C227 Production Technology lab	2.5	2.5	2.5	2.5	2.5	3.00	3.00	3.00	3.00	3.00
27	C228 Mechanics of Fluids and Hydraulic Machines lab	2.5	2.5	2.5	2.5	2.5	3.00	3.00	3.00	3.00	3.00
28	C311 Managerial Economics and Financial Analysis	1.4	1.4	1.4	1.4	1.4	1.35	1.30	1.35	1.30	1.30
29	C312 Engineering Metrology	1.6	1.6	1.6	1.6	1.6	2.05	1.90	2.00	2.10	2.10
30	C313 Dynamics of Machinery	1	1	1	1	1	0.40	0.40	0.35	0.25	0.25
31	C314 Machine Tools	1.3	1.3	1.3	1.3	1.3	2.85	2.80	2.75	2.65	2.70
32	C315 Design of machine Members-I	1	1	1	1	1	1.15	1.15	1.30	1.35	1.35
33	C316 Applied Thermodynamics II	1.2	1.2	1.2	1.2	1.2	1.20	1.20	1.20	1.25	1.25
34	C317 Thermal Engineering Lab	2.1	2.1	2.1	2.1	2.1	3.00	3.00	3.00	3.00	3.00
35	C318 Machine Tools & Metrology Lab	2.3	2.3	2.3	2.3	2.3	2.73	2.73	2.73	2.73	2.73
36	C321 Automobile Engineering	1.3	1.3	1.3	1.3	1.3	2.60	2.60	2.70	2.80	2.80
37	C322 Finite Element Methods	1	1	1	1	1	2.00	1.95	2.00	2.05	2.05
38	C323 Refrigeration & Air conditioning	1.2	1.2	1.2	1.2	1.2	2.05	2.05	2.15	2.25	2.25
39	C324 Design of Machine members-II	1	1	1	1	1	1.85	1.85	2.00	2.05	2.05

40	C325 Heat Transfer	1.1	1.1	1.1	1.1	1.1	2.00	2.00	1.90	1.85	1.85
41	C326 Industrial Management	1.1	1.1	1.1	1.1	1.1	2.05	2.00	2.05	2.00	1.95
42	C327 Heat Transfer Lab	2.5	2.5	2.5	2.5	2.5	3.00	3.00	3.00	3.00	3.00
43	C328 Advanced Communication Skills	2.4	2.4	2.4	2.4	2.4	3.00	3.00	3.00	3.00	3.00
44	C411 Operations Research	1.2	1.2	1.2	1.2	1.2	1.10	1.10	1.05	1.30	1.20
45	C412 Power plant Engineering	1.5	1.5	1.5	1.5	1.5	1.85	1.85	1.85	1.85	1.85
46	C413 CAD/CAM	1.2	1.2	1.2	1.2	1.2	2.70	2.70	2.60	2.60	2.60
47	C414 ICS	1.3	1.3	1.3	1.3	1.3	2.70	2.70	2.75	2.70	2.70
48	C415 Robotics	1	1	1	1	1	2.00	1.95	2.10	2.25	2.25
49	C416 UCMP	1.5	1.5	1.5	1.5	1.5	2.60	2.55	2.75	2.95	2.95
50	C417 CAD & Manufacturing Lab	2.5	2.5	2.5	2.5	2.5	3.00	3.00	3.00	3.00	3.00
51	C418 Production Drawing Practice & Instrumentation Lab	2.6	2.6	2.6	2.6	2.6	2.93	2.93	2.90	2.86	2.86
52	C421 Production Planning and Control	1.3	1.3	1.3	1.3	1.3	1.40	1.40	1.35	1.30	1.30
53	C422 Plant Layout and Material Handling	1.5	1.5	1.5	1.5	1.5	1.40	1.40	1.30	1.30	1.30
54	C423 Renewable Energy Sources	1.7	1.7	1.7	1.7	1.7	1.85	1.85	1.90	1.95	2.00
55	C424 Mini Project	2.4	2.4	2.4	2.4	2.4	3	3	3	3	3
56	C425 Seminar	2.4	2.4	2.4	2.4	2.4	3	3	3	3	3

57	C426 Project Work	2.5	2.5	2.5	2.5	2.5	3	3	3	3	3
58	C427 Comprehensive Viva	2.5	2.5	2.5	2.5	2.5	3	3	3	3	3

Table 2.6.2.28 CO Attainments for all courses Batch: 2013-2017

S. No	Course code/ Course title	CO 1 (T)	CO 2 (T)	CO 3 (T)	CO 4 (T)	CO 5 (T)	CO 1 (A)	CO 2 (A)	CO 3 (A)	CO 4 (A)	CO 5 (A)
1	C101 English	1.7	1.7	1.7	1.7	1.7	2.75	2.80	2.70	2.75	2.55
2	C102 Mathematics-I	1.1	1.1	1.1	1.1	1.1	1.30	1.40	1.20	0.95	0.95
3	C103 Engineering Mechanics	1.2	1.2	1.2	1.2	1.2	1.80	2.15	1.95	2.00	1.70
4	C104 Engineering Physics	1.2	1.2	1.2	1.2	1.2	1.00	1.30	1.30	1.15	0.95
5	C105 Engineering Chemistry	1.2	1.2	1.2	1.2	1.2	1.85	2.05	1.95	1.90	1.80
6	C106 Computer Programming	1.3	1.3	1.3	1.3	1.3	1.35	1.30	1.20	1.15	0.95
7	C107 Engineering Drawing	1.3	1.3	1.3	1.3	1.3	2.15	2.25	2.15	2.10	2.10
8	C108 Computer Programming Lab	2.1	2.1	2.1	2.1	2.1	2.73	2.73	2.73	2.73	2.73
9	C109 Engineering Physics and Chemistry Lab	2.2	2.2	2.2	2.2	2.2	2.86	2.86	2.86	2.86	2.86
10	C1010 English Language Communications Skills Lab	2.2	2.2	2.2	2.2	2.2	2.25	2.20	2.25	2.20	2.25
11	C1011 IT/ Engineering Workshop	2.5	2.5	2.5	2.5	2.5	3.00	3.00	3.00	3.00	3.00
12	C211 Environmental Studies	1.6	1.6	1.6	1.6	1.6	2.25	2.20	2.25	2.20	2.25
13	C212 Probability & Statistics	1.5	1.5	1.5	1.5	1.5	2.05	2.05	2.05	2.00	2.05
14	C213	1.2	1.2	1.2	1.2	1.2	2.70	2.70	2.75	2.80	2.80

	Electrical & Electronics Engg.										
15	C214 Mechanics of Solids	1.1	1.1	1.1	1.1	1.1	2.05	2.05	2.05	2.05	2.05
16	C215 Thermodynamics	1.1	1.1	1.1	1.1	1.1	1.25	1.25	1.25	1.30	1.35
17	C216 Metallurgy and Material Science	1.5	1.5	1.5	1.5	1.5	2.00	2.00	1.85	1.90	1.85
18	C217 Electrical & Electronics Engg. Lab	1.8	1.8	1.8	1.8	1.8	2.59	2.59	2.59	2.59	2.59
19	C218 Metallurgy & Mechanics of Solids lab	2	2	2	2	2	3.00	3.00	3.00	3.00	3.00
20	C221 Production Technology	1.5	1.5	1.5	1.5	1.5	2.60	2.60	2.60	2.60	2.60
21	C222 Kinematics of Machinery	1.2	1.2	1.2	1.2	1.2	2.65	2.65	2.70	2.70	2.80
22	C223 Thermal Engineering I	1.7	1.7	1.7	1.7	1.7	1.10	1.10	1.20	1.30	1.30
23	C224 Mechanics of Fluids and Hydraulic Machines	1.6	1.6	1.6	1.6	1.6	1.25	1.25	1.25	1.30	1.35
24	C225 Machine Drawing	1.6	1.6	1.6	1.6	1.6	2.00	2.00	1.85	1.90	1.85
25	C226 Mathematics-II	1.5	1.5	1.5	1.5	1.5	2.00	2.00	2.00	2.05	2.05
26	C227 Production Technology lab	2.6	2.6	2.6	2.6	2.6	3.00	3.00	3.00	3.00	3.00
27	C228 Mechanics of Fluids and Hydraulic Machines lab	2.6	2.6	2.6	2.6	2.6	3.00	3.00	3.00	3.00	3.00
28	C311 Managerial Economics and Financial Analysis	1.4	1.4	1.4	1.4	1.4	1.50	1.50	1.50	1.50	1.50
29	C312 Engineering Metrology	1.7	1.7	1.7	1.7	1.7	1.20	1.20	1.27	1.40	1.55

30	C313 Dynamics of Machinery	1	1	1	1	1	1.25	1.20	1.28	1.40	1.40
31	C314 Machine Tools	1.4	1.4	1.4	1.4	1.4	2.55	2.40	2.60	2.70	2.70
32	C315 Design of machine Members-I	1.1	1.1	1.1	1.1	1.1	1.50	1.40	1.43	1.35	1.40
33	C316 Thermal Engineering-II	1.3	1.3	1.3	1.3	1.3	1.65	1.65	1.80	1.95	1.95
34	C317 Thermal Engineering Lab	2.2	2.2	2.2	2.2	2.2	3.00	3.00	3.00	3.00	3.00
35	C318 Machine Tools & Metrology Lab	2.4	2.4	2.4	2.4	2.4	2.86	2.86	2.86	2.86	2.86
36	C321 Automobile Engineering	1.4	1.4	1.4	1.4	1.4	1.80	1.65	1.65	1.80	1.85
37	C322 Finite Element Methods	1.1	1.1	1.1	1.1	1.1	0.84	1.09	0.75	1.29	1.41
38	C323 Refrigeration & Air conditioning	1.3	1.3	1.3	1.3	1.3	1.20	1.20	1.35	1.43	1.43
39	C324 Design of Machine members-II	1.1	1.1	1.1	1.1	1.1	1.50	1.50	1.50	1.50	1.50
40	C325 Heat Transfer	1.2	1.2	1.2	1.2	1.2	1.85	1.78	1.85	1.95	1.95
41	C326 Intellectual Property Rights	1.2	1.2	1.2	1.2	1.2	0.48	0.55	0.61	0.75	0.75
42	C327 Heat Transfer Lab	2.6	2.6	2.6	2.6	2.6	2.86	2.86	2.86	2.86	2.86
43	C328 Advanced Communication Skills	2.5	2.5	2.5	2.5	2.5	3.00	3.00	3.00	3.00	3.00
44	C411 Operations Research	1.2	1.2	1.2	1.2	1.2	2.60	2.40	2.60	2.60	2.70
45	C412 Power plant Engineering	1.6	1.6	1.6	1.6	1.6	2.60	2.55	2.65	2.60	2.70
46	C413	1.3	1.3	1.3	1.3	1.3	2.70	2.70	2.70	2.50	2.55

	CAD/CAM										
47	C414 ICS	1.4	1.4	1.4	1.4	1.4	2.45	2.50	2.75	2.80	2.70
48	C415 Robotics	1.1	1.1	1.1	1.1	1.1	0.45	0.45	0.45	0.45	0.45
49	C416 UCMP	1.6	1.6	1.6	1.6	1.6	1.20	1.20	1.35	1.50	1.50
50	C417 CAD & Manufacturing Lab	2.6	2.6	2.6	2.6	2.6	3.00	3.00	3.00	3.00	3.00
51	C418 Production Drawing Practice & Instrumentation Lab	2.7	2.7	2.7	2.7	2.7	3.00	3.00	2.97	2.93	2.93
52	C421 Production Planning and Control	1.4	1.4	1.4	1.4	1.4	1.50	1.45	1.43	1.50	1.50
53	C422 Plant Layout and Material Handling	1.5	1.5	1.5	1.5	1.5	1.50	1.50	1.50	1.50	1.50
54	C423 Renewable Energy Sources	1.8	1.8	1.8	1.8	1.8	1.95	1.90	2.05	2.15	2.15
55	C424 Mini Project	2.5	2.5	2.5	2.5	2.5	3	3	3	3	3
56	C425 Seminar	2.5	2.5	2.5	2.5	2.5	3	3	3	3	3
57	C426 Project Work	2.6	2.6	2.6	2.6	2.6	3	3	3	3	3
58	C427 Comprehensive Viva	2.6	2.6	2.6	2.6	2.6	3	3	3	3	3

Table 2.6.2.29 CO Attainments for all courses Batch: 2014-2018

S. No	Course code/ Course title	CO 1 (T)	CO 2 (T)	CO 3 (T)	CO 4 (T)	CO 5 (T)	CO 6 (T)	CO 1 (A)	CO 2 (A)	CO 3 (A)	CO 4 (A)	CO 5 (A)	CO 6 (A)
1	C101 English	1.8	1.8	1.8	1.8	1.8	-	2.80	2.90	2.80	2.75	2.65	-
2	C102 Mathematics-I	1.2	1.2	1.2	1.2	1.2	-	1.10	1.20	1.00	1.15	0.95	-
3	C103 Engineering Mechanics	1.3	1.3	1.3	1.3	1.3	-	1.15	1.20	1.10	1.15	0.95	-

4	C104 Engineering Physics	1.2	1.2	1.2	1.2	1.2	-	1.15	1.35	1.05	1.25	0.95	-
5	C105 Engineering Chemistry	1.3	1.3	1.3	1.3	1.3	-	1.85	1.95	1.75	1.90	1.70	-
6	C106 Computer Programming	1.3	1.3	1.3	1.3	1.3	-	1.15	1.20	1.00	1.15	0.95	-
7	C107 Engineering Drawing	1.4	1.4	1.4	1.4	1.4	-	1.25	1.25	1.15	1.15	1.05	-
8	C108 Computer Programming Lab	2.2	2.2	2.2	2.2	2.2	-	3.00	3.00	3.00	3.00	3.00	-
9	C109 Engineering Physics and Chemistry Lab	2.3	2.3	2.3	2.3	2.3	-	3.00	3.00	3.00	3.00	3.00	-
10	C1010 English Language Communications Skills Lab	2.3	2.3	2.3	2.3	2.3	-	3.00	3.00	3.00	3.00	3.00	-
11	C1011 IT/ Engineering Workshop	2.6	2.6	2.6	2.6	2.6	-	3.00	3.00	3.00	3.00	3.00	-
12	C211 Environmental Studies	1.7	1.7	1.7	1.7	1.7	-	1.23	1.20	1.27	1.35	1.20	-
13	C212 Probability & Statistics	1.6	1.6	1.6	1.6	1.6	-	1.20	1.15	1.13	1.10	1.10	-
14	C213 Electrical & Electronics Engg.	1.3	1.3	1.3	1.3	1.3	-	2.80	2.80	3.00	2.95	2.90	-
15	C214 Mechanics of Solids	1.2	1.2	1.2	1.2	1.2	-	1.85	1.85	1.85	1.90	1.85	-
16	C215 Thermodynamics	1.2	1.2	1.2	1.2	1.2	-	1.10	1.05	1.13	1.10	1.20	-
17	C216 Metallurgy and Material Science	1.6	1.6	1.6	1.6	1.6	-	1.88	1.87	1.85	1.85	1.85	-
18	C217 Electrical & Electronics Engg. Lab	1.9	1.9	1.9	1.9	1.9	-	2.80	2.80	2.80	2.80	2.80	-

19	C218 Metallurgy & Mechanics of Solids lab	2.1	2.1	2.1	2.1	2.1	-	2.86	2.86	2.86	2.86	2.86	-
20	C221 Production Technology	1.6	1.6	1.6	1.6	1.6	-	1.10	1.05	1.12	1.10	1.10	-
21	C222 Kinematics of Machinery	1.3	1.3	1.3	1.3	1.3	-	1.10	1.10	1.05	1.00	1.05	-
22	C223 Thermal Engineering I	1.7	1.7	1.7	1.7	1.7	-	1.10	1.10	1.13	1.10	1.20	-
23	C224 Mechanics of Fluids and Hydraulic Machines	1.6	1.6	1.6	1.6	1.6	-	2.55	2.58	2.64	2.72	2.63	-
24	C225 Machine Drawing	1.7	1.7	1.7	1.7	1.7	-	1.58	1.72	1.63	1.68	1.72	-
25	C226 Mathematics-II	1.2	1.2	1.2	1.2	1.2	-	1.10	1.15	1.20	1.20	1.10	-
26	C227 Production Technology lab	2.7	2.7	2.7	2.7	2.7	-	2.86	2.86	2.86	2.86	2.86	-
27	C228 Mechanics of Fluids and Hydraulic Machines lab	2.7	2.7	2.7	2.7	2.7	-	3.00	3.00	3.00	3.00	3.00	-
28	C311 Managerial Economics and Financial Analysis	1.5	1.5	1.5	1.5	1.5	-	1.20	1.35	1.15	1.30	1.30	-
29	C312 Engineering Metrology	1.7	1.7	1.7	1.7	1.7	-	1.85	1.85	1.90	1.95	2.05	-
30	C313 Dynamics of Machinery	1.1	1.1	1.1	1.1	1.1	-	1.15	1.25	1.10	1.00	1.00	-
31	C314 Machine Tools	1.5	1.5	1.5	1.5	1.5	-	1.90	1.85	1.93	1.88	1.88	-
32	C315 Design of machine Members-I	1.2	1.2	1.2	1.2	1.2	-	1.40	1.40	1.25	1.20	1.10	-
33	C316 Thermal Engineering-II	1.4	1.4	1.4	1.4	1.4	-	1.79	1.85	1.83	1.85	1.85	-
34	C317 Thermal Engineering Lab	2.3	2.3	2.3	2.3	2.3	-	2.66	2.66	2.73	2.80	2.80	-

35	C318 Machine Tools & Metrology Lab	2.5	2.5	2.5	2.5	2.5	-	2.73	2.73	2.73	2.73	2.73	-
36	C321 Automobile Engineering	1.5	1.5	1.5	1.5	1.5	-	1.85	1.85	1.95	2.05	2.05	-
37	C322 Finite Element Methods	1.2	1.2	1.2	1.2	1.2	-	1.30	1.30	1.15	1.20	1.20	-
38	C323 Refrigeration & Air conditioning	1.4	1.4	1.4	1.4	1.4	-	1.85	1.85	1.88	1.90	1.85	-
39	C324 Design of Machine members-II	1.2	1.2	1.2	1.2	1.2	-	1.10	1.10	1.10	1.15	1.10	-
40	C325 Heat Transfer	1.3	1.3	1.3	1.3	1.3	-	1.85	1.75	1.90	1.85	1.85	-
41	C326 Human Values and Professional Ethics	1.3	1.3	1.3	1.3	1.3	-	2.00	2.00	2.08	2.15	2.15	-
42	C327 Heat Transfer Lab	2.7	2.7	2.7	2.7	2.7	-	3.00	3.00	3.00	3.00	3.00	-
43	C328 Advanced Communication Skills	2.6	2.6	2.6	2.6	2.6	-	3.00	3.00	3.00	3.00	3.00	-
44	C411 Operations Research	1.3	1.3	1.3	1.3	1.3	1.3	2.66	2.66	2.58	2.89	2.89	2.89
45	C412 Power plant Engineering	1.7	1.7	1.7	1.7	1.7	1.7	2.65	2.65	2.65	2.89	2.89	2.66
46	C413 CAD/CAM	1.4	1.4	1.4	1.4	1.4	1.4	1.68	1.69	1.69	1.69	1.69	1.69
47	C414 ICS	1.5	1.5	1.5	1.5	1.5	1.5	2.4	2.59	2.66	2.88	2.9	2.89
48	C415 Robotics	1.1	1.1	1.1	1.1	1.1	1.1	2.67	2.5	2.64	2.65	2.65	2.66
49	C416 UCMP	1.6	1.6	1.6	1.6	1.6	1.6	2.63	2.65	2.67	2.89	2.89	2.91
50	C417 CAD & Manufacturing Lab	2.7	2.7	2.7	2.7	2.7	2.7	2.87	2.8	2.9	2.8	2.8	2.88

51	C418 Production Drawing Practice & Instrumentation Lab	2.8	2.8	2.8	2.8	2.8	2.8	2.89	2.88	2.88	2.9	2.88	2.88
52	C421 Production Planning and Control	1.5	1.5	1.5	1.5	1.5	1.5	1.02	1.02	1.01	1.11	1.09	1.08
53	C422 Plant Layout and Material Handling	1.6	1.6	1.6	1.6	1.6	1.6	1.71	1.69	1.7	1.67	1.68	1.7
54	C423 Renewable Energy Sources	1.9	1.9	1.9	1.9	1.9	1.9	2.88	2.89	2.87	2.65	2.65	2.64
55	C424 Mini Project	2.6	2.6	2.6	2.6	2.6	2.6	3	3	3	3	3	3
56	C425 Seminar	2.6	2.6	2.6	2.6	2.6	2.6	3	3	3	3	3	3
57	C426 Project Work	2.7	2.7	2.7	2.7	2.7	2.7	3	3	3	3	3	3
58	C427 Comprehensive Viva	2.7	2.7	2.7	2.7	2.7	2.7	3	3	3	3	3	3

Attainment of Program Outcomes and Program Specific Outcomes

. Describe assessment tools and processes used for measuring the attainment of each of the Program Outcomes and Program Specific Outcomes

The assessment tools for the Program Outcomes (POs) and Program specific outcomes (PSOs) are categorized into two types:

1. Direct Assessment Tools
2. Indirect Assessment Tools

Table 2.6.2.30 Assessment Types

Assessment Type	Adopted Tools	Assessment Type	Adopted Tools
Direct Assessment	Internal Examination (Theory & Lab)	Indirect Assessment	Program exit survey
	External Examination (Theory & Lab)		Alumni Survey
	Major & Mini Project		Parent Survey
	Seminar & Comprehensive Viva		Employer Survey

Direct Assessments:

Performance of students in different direct assessments leads to evaluation of COs attainment which in turn leads to evaluation of attainment of POs & PSOs based on the mappings of COs to POs & PSOs.

Calculation of POs and PSOs

Each PO and PSO attained value is calculated by taking weighted average of each PO and PSO by taking into consideration CO attained values. An illustration of the calculation is shown below by considering CO-PO matrix and CO attained value.

Illustration:

Table 2.6.2.31 CO-PO matrix and CO attained value of subject MMS **(IIyear & Isem)**

CO_PO ATTAINMENT	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	CO_ATT
C214.1	2	2	1	2	3	2	3	2	0	0	1	1	0	2	1.2
C214.2	2	2	2	2	2	2	3	2	0	0	1	1	0	2	1.16
C214.3	2	2	2	2	2	2	3	2	0	0	1	1	0	2	1.27
C214.4	2	2	1	2	2	2	3	2	0	0	1	1	0	2	1.4
C214.5	2	2	1	2	2	2	3	2	0	0	1	1	0	2	1.42
C214.6	2	2	1	2	3	2	3	2	0	0	1	1	0	2	1.5
C215_ PO_ATTAINM	1.33	1.33	0.87	1.33	1.33	1.33	1.33	1.33	0	0	0.88	0.88	0	1.33	1.1

ENT														

Attainment calculation for PO1

PO1 Attainment = $\frac{(2*1.2 + 2*1.16 + 2*1.27 + 2*1.4 + 2*1.42 + 2*1.5)}{(2+2+2+2+2+2)}$ = 1.33

Indirect Assessment:

Indirect assessment tool for evaluation of the attainment level of POs & PSOs is based on Program exit (conducted at the end of four years of course), Alumni, Parent and Employer survey.
Survey is conducted based on the below format

Table2.6.2.32 POs & PSOs attainment levels

S.No.	POs and PSOs	Rate your attainment level				
		Very High (5)	High (4)	Medium (3)	Satisfactory(2)	Poor(1)
1	PO1 statement					
2	PO2 statement					
3	PO3 statement					
. . . 12	. . . PO12 statement					
13	PSO1 statement					
14	PSO2 statement					

Students/ Parents/ Employers providing a rating of equal to and more than 3 are considered for indirect attainment. A percentage of number of Students/ Parents/ Employers providing equal to and more than 3 to the total participating number of Students/ Parents/ Employers is calculated. Attainment level is found based on the following rule.

Attainment Level 0: If percentage is less than 60%.

Attainment Level 1: If percentage is in between 60% - 70%.

Attainment Level 2: If percentage is in between 70% - 80%.

Attainment Level 3: If percentage is equal to and more than 80%.

An average of all the four surveys is done for each PO and PSO to find the indirect attainment for each PO and PSO in the table 3.33.

Table 2.6.2.33 Indirect Assessment

Survey	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
Exit Survey	3	1	3	2	2	1	1	2	3	3	2	2	3	2
Parent Feedback	3	3	3	3	2	3	2	1	3	3	3	3	3	3
Employer feedback	3	2	3	3	3	2	1	1	1	3	3	3	3	3
Alumni Feedback	3	3	3	2	3	2	1	1	3	3	2	1	3	2
Average	3.00	2.25	3.00	2.50	2.50	2.00	1.25	1.25	2.50	3.00	2.50	2.25	3.00	2.50

The overall attainment of POs & PSOs is calculated with the weightage of 80% of Direct Assessment and 20% of Indirect Assessment.

. Provide results of evaluation of each PO & PSO

All subjects (Theory and Lab) including projects, seminar and comprehensive viva POs and PSOs attainments are shown in one table for an academic year.

Below is the POs and PSOs attainment evaluation table for academic year 2017-2018.

Table 2.6.2.34 PO Attainment for all courses Batch: 2012-2016

S. No	Course code/ Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C101 English	-	-	-	-	-	-	-	-	-	2.39	-	-
2	C102 Mathematics-I	0.77	0.62	0.63	0.53	-	-	-	-	-	-	-	-
3	C103 Engineering Mechanics	1.92	1.42	0.88	1.02	0.94	-	-	-	-	-	-	-
4	C104	1.15	1.15	0.77	0.77	0.77	-	-	-	-	-	-	-

	Engineering Physics												
5	C105 Engineering Chemistry	1.26	1.33	1.16	0.82	1.46	-	-	-	-	-	-	-
6	C106 Computer Programming	1.23	1.36	0.61	0.61	0.77	-	-	-	-	-	-	-
7	C107 Engineering Drawing	1.46	-	-	0.73	1.02	-	-	-	-	-	-	-
8	C108 Computer Programming Lab	1.02	0.88	0.34	0.34	0.42	-	-	-	-	-	-	-
9	C109 Engineering Physics and Chemistry Lab	1.72	1.91	1.91	1.34	0.95	-	-	-	-	-	-	-
10	C1010 English Language Communications Skills Lab	-	-	-	-	-	-	-	-	-	2.20	-	-
11	C1011 IT/ Engineering Workshop	1.80	2.00	2.00	1.40	1.00	-	-	-	-	-	-	-
12	C211 Environmental Studies	2.35	2.35	2.42	2.35	2.35	2.40	2.37	-	-	-	-	-
13	C212 Probability & Statistics	2.11	2.11	2.05	2.11	2.18	-	-	-	-	-	-	-
14	C213 Electrical & Electronics Engg.	1.91	1.90	1.95	1.89	1.85	-	-	-	-	-	-	-
15	C214 Mechanics	2.64	2.64	2.63	-	-	-	-	-	-	-	-	-

	of Solids												
16	C215 Thermodynamics	1.90	1.89	1.89	1.89	1.90	1.91	1.92	-	-	-	1.95	1.91
17	C216 Metallurgy and Material Science	2.65	2.66	0.00	2.66	2.66	2.66	2.66	-	-	-	-	2.66
18	C217 Electrical & Electronics Engg. Lab	2.93	0.98	1.95	2.93	-	-	-	-	1.95	-	-	-
19	C218 Metallurgy & Mechanics of Solids lab	2.20	2.00	2.67	2.00	2.50	-	-	-	-	-	-	-
20	C221 Production Technology	2.63	2.63	2.63	2.63	2.63	2.63	2.63	-	-	-	-	2.63
21	C222 Kinematics of Machinery	1.85	1.86	1.87	1.85	1.86	-	-	-	-	-	-	-
22	C223 Applied Thermodynamics I	1.95	1.95	1.95	1.95	1.95	-	-	-	-	-	-	-
23	C224 Mechanics of Fluids and Hydraulic Machines	1.18	1.18	1.15	1.20	1.20	-	-	-	-	-	-	-
24	C225 Machine Drawing	1.30	1.25	-	-	-	-	-	-	1.31	1.29	-	-
25	C226 Numerical Methods	2.77	2.78	2.80	2.79	-	-	-	-	-	-	-	-
26	C227 Production Technology lab	-	-	1.00	1.00	2.00	-	-	-	-	-	-	-
27	C228 Mechanics of Fluids and Hydraulic Machines lab	2.00	2.00	1.00	1.00	1.00	-	-	-	-	-	-	-

28	C311 Managerial Economics and Financial Analysis	1.23	1.32	0.44	0.97	1.32	-	-	-	-	-	0.44	-
29	C312 Engineering Metrology	1.77	0.82	0.68	0.82	1.22	-	-	-	-	-	-	-
30	C313 Dynamics of Machinery	0.33	0.23	0.22	0.20	0.22	-	-	-	-	-	-	-
31	C314 Machine Tools	1.83	2.56	1.83	-	-	-	-	-	-	-	-	-
32	C315 Design of machine Members-I	0.84	0.84	0.84	0.84	0.84	-	-	-	-	-	-	-
33	C316 Applied Thermodynamics II	-	0.49	0.49	0.41	0.41	0.73	0.49	-	-	-	-	0.41
34	C317 Thermal Engineering Lab	3.00	-	3.00	-	-	-	2.00	-	2.00	-	-	-
35	C318 Machine Tools & Metrology Lab	2.73	1.09	0.91	2.73	0.91	-	-	-	1.82	-	-	-
36	C321 Automobile Engineering	2.15	0.87	2.17	1.51	1.18	2.80	2.80	1.87	-	-	-	1.37
37	C322 Finite Element Methods	2.01	2.01	-	1.34	0.67	-	-	-	-	-	-	-
38	C323 Refrigeration & Air conditioning	1.45	1.58	1.31	1.17	1.59	0.72	0.72	0.72	0.73	-	0.72	0.72
39	C324 Design of Machine members-II	1.43	1.43	1.43	1.31	1.43	-	-	-	-	-	-	-

40	C325 Heat Transfer	1.66	1.16	0.79	0.86	0.63	-	-	0.65	-	-	-	0.63
41	C326 Industrial Management	-	-	-	-	-	0.67	-	2.01	-	0.67	0.67	-
42	C327 Heat Transfer Lab	2.80	2.40	1.00	1.00	1.00	-	-	-	-	-	-	-
43	C328 Advanced Communication Skills	-	-	-	-	-	-	-	-	-	3.00	-	-
44	C411 Operations Research	1.15	0.93	1.01	0.93	0.77	-	-	-	-	-	-	-
45	C412 Power plant Engineering	1.70	1.85	1.70	1.70	1.54	1.85	1.85	1.23	1.23	0.62	0.62	0.62
46	C413 CAD/CAM	2.29	2.47	0.88	1.59	2.29	0.88	2.47	0.88	2.65	1.41	1.76	2.64
47	C414 ICS	2.53	2.53	0.90	1.80	2.35	0.90	2.35	0.90	0.90	-	-	1.81
48	C415 Robotics	2.11	1.40	0.90	1.61	1.05	0.67	-	0.67	-	-	-	0.72
49	C416 UCMP	1.49	2.22	1.46	1.48	-	-	-	-	-	-	-	-
50	C417 Cad & Manufacturing Lab	2.60	2.00	1.00	2.00	1.80	1.00	1.00	2.00	1.60	1.00	-	-
51	C418 Production Drawing Practice & Instrumentation Lab	1.54	1.16	0.96	1.44	1.21	-	-	-	-	1.61	1.28	0.96
52	C421 Production	0.73	1.13	1.06	0.88	-	-	-	-	-	-	-	-

	Planning and Control												
53	C422 Plant Layout and Material Handling	0.53	0.71	0.89	0.89	0.81	-	-	-	-	-	-	-
54	C423 Renewable Energy Sources	1.27		1.27	0.64		0.63	0.63	-	-	-	0.67	0.64
55	C424 Mini Project	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
56	C425 Seminar	2.00	2.00	2.00	2.00	1.00	2.00	1.00	-	2.00	2.00	2.00	3.00
57	C426 Project Work	3.00	2.00	3.00	3.00	3.00	3.00	3.00	2.00	3.00	3.00	3.00	3.00
58	C427 Comprehensive Viva	3.00	3.00	2.00	3.00	3.00	-	-	-	-	2.00	-	-
	Direct Attainment	1.87	1.68	1.46	1.53	1.53	1.67	1.93	1.45	1.81	1.78	1.46	1.57
	Indirect Attainment	2.75	2.50	2.50	2.50	2.25	2.25	2.25	2.25	2.75	2.50	2.50	2.75
	0.8* DA	1.50	1.34	1.17	1.22	1.22	1.34	1.54	1.16	1.45	1.42	1.17	1.26
	0.2* IA	0.55	0.50	0.50	0.50	0.45	0.45	0.45	0.45	0.55	0.50	0.50	0.55
	PO Attainment	2.05	1.84	1.67	1.72	1.67	1.79	1.99	1.61	2.00	1.92	1.67	1.81
	Percentage of PO attainment (on a scale of 3)	68.33	61.33	55.67	57.33	55.67	59.67	66.33	53.67	66.67	64.00	55.67	60.33

Table 2.6.2.35 PO Attainments for all courses Batch: 2013-2017

S. No	Course code/ Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C101 English										2.34		
2	C102	0.86	0.71	0.69	0.59								

	Mathematics-I												
3	C103 Engineering Mechanics	1.79	1.41	1.14	1.30	0.92	-	-	-	-	-	-	-
4	C104 Engineering Physics	1.14	1.14	0.76	0.76	0.73	-	-	-	-	-	-	-
5	C105 Engineering Chemistry	0.94	1.00	0.88	0.60	1.11	-	-	-	-	-	-	-
6	C106 Computer Programming	0.95	0.90	0.42	0.50	0.45	-	-	-	-	-	-	-
7	C107 Engineering Drawing	1.48	-	-	0.79	1.04	-	-	-	-	-	-	-
8	C108 Computer Programming Lab	1.45	1.45	1.45	1.82	2.73	-	-	-	1.82	0.91	-	-
9	C109 Engineering Physics and Chemistry Lab	1.72	1.91	1.91	1.34	0.95	-	-	-	-	-	-	-
10	C1010 English Language Communications Skills Lab										1.64		
11	C1011 IT/ Engineering Workshop	1.80	2.00	2.00	1.40	1.00							
12	C211 Environmental Studies	0.73	0.74	0.75	0.75	1.47	0.75	1.24					
13	C212 Probability & Statistics	1.09	0.68	0.68	0.91	0.68							
14	C213 Electrical & Electronics Engg.	2.41	2.29	0.92	2.47	1.87							

15	C214 Mechanics of Solids	2.05	2.05	1.64									
16	C215 Thermodynamics	0.42	0.75	0.68	0.85	0.43	0.76	1.09				0.83	0.43
17	C216 Metallurgy and Material Science	1.41	1.92		1.28	1.28	0.64	1.28					1.92
18	C217 Electrical & Electronics Engg. Lab	2.59	0.86	1.73	2.59					1.73			
19	C218 Metallurgy & Mechanics of Solids lab	2.20	2.00	2.67	2.00	2.50							
20	C221 Production Technology	2.43	2.60	0.87	1.91	2.60	0.87	1.73					2.60
21	C222 Kinematics of Machinery	2.16	1.26	0.91	1.36	1.44							
22	C223 Thermal Engineering - I	1.20	0.57	0.43	0.49	0.80							
23	C224 Mechanics of Fluids and Hydraulic Machines	1.28	0.85	0.43	0.83	0.42							
24	C225 Machine Drawing	0.97	0.63							1.13	0.96		
25	C226 Mathematics-II	0.94	0.67	0.68	0.91								
26	C227 P roduction Technology lab			1.00	1.00	2.00							
27	C228 Mechanics of Fluids and Hydraulic Machines lab	2.00	2.00	1.00	1.00	1.00							

28	C311 Managerial Economics and Financial Analysis	1.50	1.50	1.50	1.50	1.50	-	-	-	-	-	1.50	-
29	C312 Engineering Metrology	1.34	1.34	1.32	1.34	1.35	-	-	-	-	-	-	-
30	C313 Dynamics of Machinery	1.31	1.29	1.31	1.29	1.31	-	-	-	-	-	-	-
31	C314 Machine Tools	2.63	2.59	2.63	-	-	-	-	-	-	-	-	-
32	C315 Design of machine Members-I	1.42	1.42	1.42	1.42	1.42	-	-	-	-	-	-	-
33	C316 Thermal Engineering-II	-	1.78	1.78	1.80	1.84	1.80	1.78	-	-	-	-	1.80
34	C317 Thermal Engineering Lab	3.00	-	3.00	-	-	-	3.00	-	3.00	-	-	-
35	C318 Machine Tools & Metrology Lab	2.86	2.86	2.86	2.86	2.86	-	-	-	2.86	-	-	-
36	C321 Automobile Engineering	1.75	1.73	1.80	1.80	1.78	1.85	1.85	1.85	-	-	-	1.83
37	C322 Finite Element Methods	1.08	1.08	-	1.08	1.08	-	-	-	-	-	-	-
38	C323 Refrigeration & Air conditioning	1.34	1.33	1.36	1.36	1.34	1.32	1.32	1.32	1.35	-	1.32	1.32
39	C324 Design of Machine members-II	1.50	1.50	1.50	1.50	1.50	-	-	-	-	-	-	-
40	C325 Heat Transfer	1.87	1.87	1.90	1.88	1.90	-	-	1.86	-	-	-	1.90

41	C326 Intellectual Property Rights	-	-	-	-	-	0.63	-	0.63	-	0.63	0.63	-
42	C327 Heat Transfer Lab	2.86	2.86	2.86	2.86	2.86	-	-	-	-	-	-	-
43	C328 Advanced Communication Skills	-	-	-	-	-	-	-	-	-	3.00	-	-
44	C411 Operations Research	2.58	2.58	2.58	2.59	1.71	-	-	-	-	-	-	-
45	C412 Power plant Engineering	2.66	2.65	2.65	2.65	1.76	2.64	2.64	1.76	1.76	0.87	0.88	0.88
46	C413 CAD/CAM	2.62	2.63	0.88	1.77	2.63	0.87	2.63	0.87	2.61	1.74	1.73	2.63
47	C414 ICS	2.65	2.65	0.89	0.83	2.67	0.83	2.67	0.88	0.82	-	-	1.76
48	C415 Robotics	0.15	-	0.15	0.15	0.15	0.15	-	0.15	-	-	-	0.15
49	C416 UCMP	0.91	1.36	0.89	0.91	-	-	-	-	-	-	-	-
50	C417 Cad & Manufacturing Lab	3.00	2.00	1.00	2.00	2.00	1.00	1.00	2.00	2.00	1.00	-	-
51	C418 Production Drawing Practice & Instrumentation Lab	1.97	1.98	0.98	0.98	0.99	-	-	-	-	0.99	0.99	0.98
52	C421 Production Planning and Control	0.98	0.98	0.97	0.49	-	-	-	-	-	-	-	-
53	C422 Plant Layout and Material Handling	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-

54	C423 Renewable Energy Sources	1.36	-	1.36	0.68	-	0.68	0.67	-	-	-	0.72	0.68
55	C424 Mini Project	3	3	3	3	3	3	3	3	3	3	3	3
56	C425 Seminar	2	2	2	2	1	2	1	-	2	2	2	3
57	C426 Project Work	3	2	3	3	3	3	3	2	3	3	3	3
58	C427 Comprehensive Viva	3	3	2	3	3	-	-	-	-	2	-	-
	Direct Attainment	1.76	1.66	1.44	1.47	1.6	1.34	1.87	1.48	2.08	1.72	1.51	1.62
	Indirect Attainment	2.8	2.25	2.5	2.5	2.25	2.25	1.75	1.5	2.5	2.5	2.5	2.75
	0.8* DA	1.41	1.33	1.15	1.18	1.28	1.07	1.5	1.18	1.66	1.38	1.21	1.3
	0.2* IA	0.56	0.45	0.5	0.5	0.45	0.45	0.35	0.3	0.5	0.5	0.5	0.55
	PO Attainment	1.97	1.78	1.65	1.68	1.73	1.52	1.85	1.48	2.16	1.88	1.71	1.85
	Percentage of PO attainment (on a scale of 3)	65.67	59.33	55	56	57.67	50.67	61.67	49.33	72	62.67	57	61.67

Table 2.6.2.36 PO Attainments for all courses Batch: 2014-2018

S. No	Course code/ Course title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	C101 English	-	-	-	-	-	-	-	-	-	2.40	-	-
2	C102 Mathematics-I	0.79	0.64	0.65	0.53	-	-	-	-	-	-	-	-
3	C103 Engineering Mechanics	1.11	0.80	0.52	0.58	0.54	-	-	-	-	-	-	-
4	C104 Engineering Physics	1.15	1.15	0.77	0.77	0.75	-	-	-	-	-	-	-
5	C105 Engineering Chemistry	0.90	0.97	0.83	0.57	1.06	-	-	-	-	-	-	-
6	C106	1.13	1.10	1.13	1.06	1.15	-	-	-	-	-	-	1.09

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	Computer Programming												
7	C107 Engineering Drawing	0.78	-	-	0.39	0.54	-	-	-	-	-	-	-
8	C108 Computer Programming Lab	1.60	1.60	1.60	2.00	3.00	-	-	-	2.00	1.00	-	-
9	C109 Engineering Physics and Chemistry Lab	1.80	2.00	2.00	1.40	1.00	-	-	-	-	-	-	1.00
10	C1010 English Language Communications Skills Lab	-	-	-	-	-	-	-	-	-	2.20	-	-
11	C1011 IT/ Engineering Workshop	1.80	2.00	2.00	1.40	1.00	-	-	-	-	-	-	-
12	C211 Environmental Studies	1.28	1.25	1.23	1.20	1.20	1.23	1.27	-	-	-	-	-
13	C212 Probability & Statistics	1.14	1.14	1.10	1.14	1.18	-	-	-	-	-	-	-
14	C213 Electrical & Electronics Engg.	2.85	2.91	3.00	2.95	2.95	-	-	-	-	-	-	-
15	C214 Mechanics of Solids	1.86	1.86	1.86	-	-	-	-	-	-	-	-	-
16	C215 Thermodynamics	1.09	1.11	1.11	1.11	1.13	1.15	1.17	-	-	-	1.10	1.12
17	C216 Metallurgy and Material Science	1.86	1.86	-	1.86	1.86	1.86	1.86	-	-	-	-	1.86
18	C217 Electrical & Electronics Engg. Lab	2.80	2.80	2.80	2.80	-	-	-	-	2.80	-		

19	C218 Metallurgy & Mechanics of Solids lab	2.86	2.86	2.86	2.86	2.86	-	-	-	-	-	-	-
20	C221 Production Technology	1.09	1.09	1.09	1.09	1.09	1.09	1.09	-	-	-	-	1.09
21	C222 Kinematics of Machinery	1.07	1.06	1.03	1.05	1.06	-	-	-	-	-	-	-
22	C223 Thermal Engineering - I	1.13	1.13	1.20	1.12	1.13	-	-	-	-	-	-	-
23	C224 Mechanics of Fluids and Hydraulic Machines	2.62	2.62	2.65	2.64	2.64	-	-	-	-	-	-	-
24	C225 Machine Drawing	1.68	1.68	-	-	-	-	-	-	1.66	1.69	-	-
25	C226 Mathematics-II	1.14	1.14	1.15	1.14	-	-	-	-	-	-	-	-
26	C227 Production Technology lab	-	-	2.86	2.86	2.86	-	-	-	-	-	-	-
27	C228 Mechanics of Fluids and Hydraulic Machines lab	3.00	3.00	3.00	3.00	3.00	-	-	-	-	-	-	-
28	C311 Managerial Economics and Financial Analysis	1.27	1.26	1.26	1.26	1.26	-	-	-	-	-	1.26	-
29	C312 Engineering Metrology	-	1.93	1.92	1.93	1.94	-	-	-	-	-	-	-
30	C313 Dynamics of Machinery	1.10	1.12	1.10	1.11	1.10	-	-	-	-	-	-	-
31	C314	1.89	1.88	1.89	-	-	-	-	-	-	-	-	-

	Machine Tools												
32	C315 Design of machine Members-I	1.27	1.27	1.27	1.27	1.27	-	-	-	-	-	-	-
33	C316 Thermal Engineering-II	-	1.83	1.84	1.83	1.83	1.83	1.83	-	-	-	-	1.83
34	C317 Thermal Engineering Lab	2.73	-	2.68	-	-	-	2.73	-	2.73	-	-	-
35	C318 Machine Tools & Metrology Lab	2.73	2.73	2.73	2.73	2.73	-	-	-	2.73	-	-	-
36	C321 Automobile Engineering	1.93	1.85	2.04	1.97	1.90	2.05	2.05	2.05	-	-	-	1.98
37	C322 Finite Element Methods	1.23	1.23	-	1.23	1.23	-	-	-	-	-	-	-
38	C323 Refrigeration & Air conditioning	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	-	1.87	1.87
39	C324 Design of Machine members-II	1.11	1.11	1.11	1.11	1.11	-	-	-	-	-	-	-
40	C325 Heat Transfer	1.84	1.84	1.84	1.83	1.86	-	-	1.82	-	-	-	1.86
41	C326 Human Value & Professional Ethics	-	-	-	-	-	2.08	-	2.08	-	2.08	2.08	-
42	C327 Heat Transfer Lab	3.00	3.00	3.00	3.00	3.00	-	-	-	-	-	-	-
43	C328 Advanced Communication Skills	-	-	-	-	-	-	-	-	-	-	-	-
44	C411 Operations Research	2.76	2.77	2.78	2.78	2.77	-	-	-	-	-	-	-

45	C412 Power plant Engineering	1.81	2.71	1.80	1.80	2.74	2.73	2.73	1.85	2.73	0.88	1.80	1.82
46	C413 CAD/CAM	1.69	1.69	1.13	1.13	1.69	1.13	1.69	1.13	1.69	1.13	1.13	1.69
47	C414 ICS	2.73	2.74	1.83	1.66	2.75	0.83	2.76	1.81	0.80	-	-	2.72
48	C415 Robotics	2.63	1.74	1.77	2.63	1.76	0.89	-	0.89	-	-	-	0.89
49	C416 UCMP	1.86	2.78	1.84	1.86	-	-	-	-	-	-	-	-
50	C417 CAD & Manufacturing Lab	2.86	2.86	1.90	2.86	1.90	1.90	1.90	2.86	1.91	1.90	-	-
51	C418 Production Drawing Practice & Instrumentation Lab	1.92	1.92	0.96	0.96	1.92	-	-	-	-	1.93	1.92	0.96
52	C421 Production Planning and Control	0.69	1.05	0.70	0.71	-	-	-	-	-	-	-	-
53	C422 Plant Layout and Material Handling	1.13	1.13	1.69	1.69	1.13	1.13	1.69	0.56	-	-	1.13	1.13
54	C423 Renewable Energy Sources	2.76	-	2.76	1.84	-	0.93	1.86	-	-	-	0.88	1.84
55	C424 Mini Project	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
56	C425 Seminar	2.00	2.00	2.00	2.00	1.00	2.00	1.00	-	2.00	2.00	2.00	3.00
57	C426 Project Work	3.00	2.00	3.00	3.00	3.00	3.00	3.00	2.00	3.00	3.00	3.00	3.00
58	C427 Comprehensive Viva	3.00	3.00	2.00	3.00	3.00	-	-	-	-	2.00	-	-
	Direct Attainment	1.86	1.83	1.79	1.77	1.87	1.71	1.97	1.83	2.22	1.94	1.76	1.78
	Indirect Attainment	2.80	2.25	2.50	2.50	2.25	2.25	1.75	1.50	2.50	2.50	2.00	2.75

	0.8* DA	1.49	1.46	1.43	1.42	1.50	1.37	1.58	1.46	1.78	1.55	1.41	1.42
	0.2* IA	0.56	0.45	0.50	0.50	0.45	0.45	0.35	0.30	0.50	0.50	0.50	0.55
	PO Attainment	2.05	1.91	1.93	1.92	1.95	1.82	1.93	1.76	2.28	2.05	1.91	1.97
	Percentage of PO attainment (on a scale of 3)	68.33	63.67	64.33	64.00	65.00	60.67	64.33	58.67	76.00	68.33	63.67	65.67

Table 2.6.2.37 PSO Attainment for all courses Batch: 2012-2016

S. No	Course code/ Course title	PSO1	PSO2
1	C101 English	-	-
2	C102 Mathematics-I	-	-
3	C103 Engineering Mechanics	-	-
4	C104 Engineering Physics	-	-
5	C105 Engineering Chemistry	-	-
6	C106 Computer Programming	-	-
7	C107 Engineering Drawing	2.17	-
8	C108 Computer Programming Lab	-	-
9	C109 Engineering Physics and Chemistry Lab	-	-
10	C1010 English Language Communications Skills Lab	-	-
11	C1011 IT/ Engineering Workshop	-	1.40
12	C211 Environmental Studies	-	-
13	C212 Probability & Statistics	-	-
14	C213 Electrical & Electronics Engg.	-	-
15	C214	2.64	2.64

	Mechanics of Solids		
16	C215 Thermodynamics	1.92	1.91
17	C216 Metallurgy and Material Science	2.66	2.66
18	C217 Electrical & Electronics Engg. Lab	-	-
19	C218 Metallurgy & Mechanics of Solids lab	-	2.50
20	C221 Production Technology	2.63	2.63
21	C222 Kinematics of Machinery	-	1.87
22	C223 Applied Thermodynamics I	-	-
23	C224 Mechanics of Fluids and Hydraulic Machines	-	-
24	C225 Machine Drawing	-	-
25	C226 Numerical Methods	-	-
26	C227 Production Technology lab	-	3.00
27	C228 Mechanics of Fluids and Hydraulic Machines lab	-	-
28	C311 Managerial Economics and Financial Analysis	-	-
29	C312 Engineering Metrology	-	-
30	C313 Dynamics of Machinery	-	0.19
31	C314 Machine Tools	-	1.85
32	C315 Design of machine Members-I	-	1.26
33	C316 Applied Thermodynamics II	-	0.40
34	C317	-	-

	Thermal Engineering Lab		
35	C318 Machine Tools & Metrology Lab	-	2.00
36	C321 Automobile Engineering	-	0.89
37	C322 Finite Element Methods	-	-
38	C323 Refrigeration & Air conditioning	0.72	0.72
39	C324 Design of Machine members-II	-	1.96
40	C325 Heat Transfer	-	-
41	C326 Industrial Management	-	-
42	C327 Heat Transfer Lab	-	-
43	C328 Advanced Communication Skills	-	-
44	C411 Operations Research	-	-
45	C412 Power plant Engineering	1.23	1.11
46	C413 CAD/CAM	1.59	1.32
47	C414 ICS	1.63	0.90
48	C415 Robotics	1.19	1.46
49	C416 UCMP	-	1.67
50	C417 Cad & Manufacturing Lab	3.00	3.00
51	C418 Production Drawing Practice & Instrumentation Lab	-	0.97
52	C421 Production Planning and Control	-	
53	C422	-	0.81

	Plant Layout and Material Handling		
54	C423 Renewable Energy Sources	-	0.64
55	C424 Mini Project	3.00	3.00
56	C425 Seminar	2.00	2.00
57	C426 Project Work	2.00	3.00
58	C427 Comprehensive Viva	2.00	3.00
	Direct Attainment	1.98	1.75
	Indirect Attainment	2.75	2.50
	0.8* DA	1.58	1.40
	0.2* IA	0.55	0.50
	PO Attainment	2.13	1.90
	Percentage of PO attainment (on a scale of 3)	71.00	63.33

Table2.6.2.38 PSO Attainments for all courses Batch: 2013-2017

S. No	Course code/ Course title	PSO1	PSO2
1	C101 English	-	-
2	C102 Mathematics-I	-	-
3	C103 Engineering Mechanics	-	-
4	C104 Engineering Physics	-	-
5	C105 Engineering Chemistry	-	-
6	C106 Computer Programming	-	-
7	C107	-	-

	Engineering Drawing		
8	C108 Computer Programming Lab	-	-
9	C109 Engineering Physics and Chemistry Lab	-	-
10	C1010 English Language Communications Skills Lab	-	-
11	C1011 IT/ Engineering Workshop	-	1.40
12	C211 Environmental Studies	-	-
13	C212 Probability & Statistics	-	-
14	C213 Electrical & Electronics Engg.	-	-
15	C214 Mechanics of Solids	1.37	1.37
16	C215 Thermodynamics	0.51	0.43
17	C216 Metallurgy and Material Science	1.28	1.28
18	C217 Electrical & Electronics Engg. Lab	0.86	0.86
19	C218 Metallurgy & Mechanics of Solids lab		2.50
20	C221 Production Technology	2.60	2.60
21	C222 Kinematics of Machinery		1.35
22	C223 Thermal Engineering - I		
23	C224 Mechanics of Fluids and Hydraulic Machines	-	-
24	C225 Machine Drawing	-	-
25	C226 Mathematics-II	-	-
26	C227	-	3.00

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	Production Technology lab		
27	C228 Mechanics of Fluids and Hydraulic Machines lab	-	-
28	C311 Managerial Economics and Financial Analysis	-	-
29	C312 Engineering Metrology	-	-
30	C313 Dynamics of Machinery	-	1.28
31	C314 Machine Tools	-	2.56
32	C315 Design of machine Members-I	-	1.42
33	C316 Thermal Engineering-II	-	1.65
34	C317 Thermal Engineering Lab	-	-
35	C318 Machine Tools & Metrology Lab	-	2.86
36	C321 Automobile Engineering	-	1.75
37	C322 Finite Element Methods	-	-
38	C323 Refrigeration & Air conditioning	1.32	1.32
39	C324 Design of Machine members-II	-	1.50
40	C325 Heat Transfer	-	-
41	C326 Intellectual Property Rights	-	-
42	C327 Heat Transfer Lab	-	2.86
43	C328 Advanced Communication Skills	-	3.00
44	C411 Operations Research	-	-
45	C412	1.78	1.76

	Power plant Engineering		
46	C413 CAD/CAM	1.75	1.74
47	C414 ICS	1.77	0.88
48	C415 Robotics	0.15	0.15
49	C416 UCMP	-	0.91
50	C417 Cad & Manufacturing Lab	3.00	3.00
51	C418 Production Drawing Practice & Instrumentation Lab	-	0.98
52	C421 Production Planning and Control	-	-
53	C422 Plant Layout and Material Handling	-	1.00
54	C423 Renewable Energy Sources	-	0.68
55	C424 Mini Project	3	3
56	C425 Seminar	2	2
57	C426 Project Work	2	3
58	C427 Comprehensive Viva	2	3
	Direct Attainment	1.65	1.82
	Indirect Attainment	2.75	2.25
	0.8* DA	1.32	1.46
	0.2* IA	0.55	0.45
	PO Attainment	1.87	1.91
	Percentage of PO attainment (on a scale of 3)	62.33	63.67

Table 2.6.2.39 PSO Attainments for all courses Batch: 2014-2018

S. No	Course code/ Course title	PSO1	PSO2
1	C101	-	-

	English		
2	C102 Mathematics-I	-	-
3	C103 Engineering Mechanics	-	-
4	C104 Engineering Physics	-	-
5	C105 Engineering Chemistry	-	-
6	C106 Computer Programming	-	-
7	C107 Engineering Drawing	1.15	-
8	C108 Computer Programming Lab	-	-
9	C109 Engineering Physics and Chemistry Lab	-	-
10	C1010 English Language Communications Skills Lab	-	-
11	C1011 IT/ Engineering Workshop	-	-
12	C211 Environmental Studies	-	-
13	C212 Probability & Statistics	-	-
14	C213 Electrical & Electronics Engg.	-	-
15	C214 Mechanics of Solids	1.86	1.86
16	C215 Thermodynamics	1.11	1.12
17	C216 Metallurgy and Material Science	1.86	1.86
18	C217 Electrical & Electronics Engg. Lab	2.80	2.80
19	C218 Metallurgy & Mechanics of Solids lab	-	1.86
20	C221	1.09	1.09

	Production Technology		
21	C222 Kinematics of Machinery	-	1.06
22	C223 Thermal Engineering - I	-	-
23	C224 Mechanics of Fluids and Hydraulic Machines	-	-
24	C225 Machine Drawing	-	-
25	C226 Mathematics-II	-	-
26	C227 Production Technology lab	-	2.86
27	C228 Mechanics of Fluids and Hydraulic Machines lab	-	3.00
28	C311 Managerial Economics and Financial Analysis	-	-
29	C312 Engineering Metrology	-	-
30	C313 Dynamics of Machinery	-	1.14
31	C314 Machine Tools	-	1.89
32	C315 Design of machine Members-I	-	1.27
33	C316 Thermal Engineering-II	-	1.79
34	C317 Thermal Engineering Lab	-	-
35	C318 Machine Tools & Metrology Lab	-	2.73
36	C321 Automobile Engineering	-	1.92
37	C322 Finite Element Methods	-	-
38	C323 Refrigeration & Air conditioning	1.87	87
39	C324	-	1.11

	Design of Machine members-II		
40	C325 Heat Transfer	-	-
41	C326 Human Values and Professional Ethics	-	-
42	C327 Heat Transfer Lab	-	3.00
43	C328 Advanced Communication Skills	-	3.00
44	C411 Operations Research	-	-
45	C412 Power plant Engineering	1.83	1.80
46	C413 CAD/CAM	1.13	1.12
47	C414 ICS	1.83	1.81
48	C415 Robotics	1.77	1.78
49	C416 UCMP	-	2.78
50	C417 Cad & Manufacturing Lab	2.86	2.86
51	C418 Production Drawing Practice & Instrumentation Lab	-	1.92
52	C421 Production Planning and Control	-	-
53	C422 Plant Layout and Material Handling	1.13	1.13
54	C423 Renewable Energy Sources	-	1.84
55	C424 Mini Project	3.00	3.00
56	C425 Seminar	2.00	2.00
57	C426 Project Work	2.00	3.00
58	C427	2.00	3.00

	Comprehensive Viva		
	Direct Attainment	1.76	2.09
	Indirect Attainment	2.75	2.25
	0.8* DA	1.41	1.67
	0.2* IA	0.55	0.45
	PO Attainment	1.96	2.12
	Percentage of PO attainment (on a scale of 3)	65.33	70.67

Table 2.6.2.40 PO Attainment for all three batches

Batch	PO 1 (A)	PO 2 (A)	PO 3 (A)	PO 4 (A)	PO 5 (A)	PO 6 (A)	PO 7 (A)	PO 8 (A)	PO 9 (A)	PO 10 (A)	PO 11 (A)	PO 12 (A)
2012-16	2.05	1.84	1.67	1.72	1.67	1.79	1.99	1.61	2.00	1.92	1.67	1.81
2013-17	1.97	1.78	1.65	1.68	1.73	1.52	1.85	1.48	2.16	1.88	1.71	1.85
2014-18	2.05	1.91	1.93	1.92	1.95	1.82	1.93	1.76	2.28	2.05	1.91	1.97

Table 2.6.2.41 PSO Attainment for all three batches

Year	PSO 1 (A)	PSO 2 (A)
2012-16	2.13	1.90
2013-17	1.87	1.91
2014-18	1.96	2.12