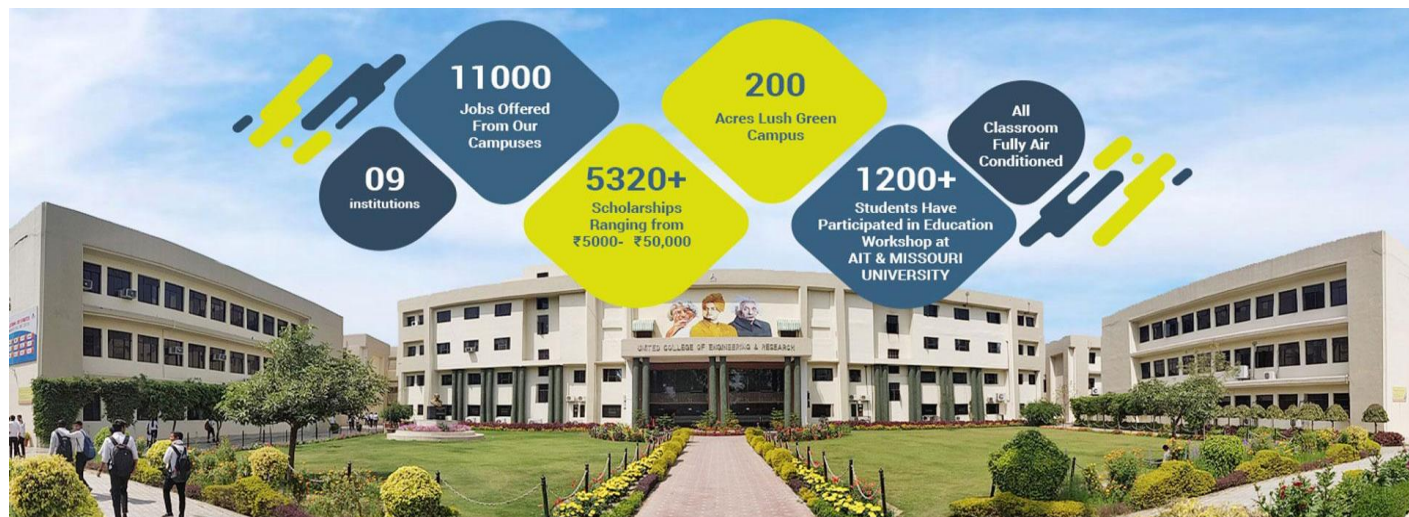


Department of Computer Science and Engineering



United College of Engineering & Research
UPSIDC Industrial Area, Prayagraj, U.P.-211010

United College of Engineering & Research

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

OUTCOME BASED EDUCATION

**CO-PO/PSO & PEO ASSESSMENT AND ATTAINMENT
PROCESS MANUAL**

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1. OUTCOME BASED EDUCATION

The Outcome Based Education (OBE) clearly focus and organize all available things in an educational system around in favor of making students demonstrate that they **"know and are able to do"** whatever the required outcomes are. OBE helps institutions in measuring their learning outcomes and enabling students to develop new skills that prepare them to stand out with their global counterparts.

Instead of passing the same curriculum again and again to next generation students, it is changed as and when desired as per the needs of today's students.

Instead of stressing upon on completing the syllabus by the end of the semester, the faculties are encouraged on developing new skills in the students. Further, instead of assessing students on their grade, they are assessed on the 'Levels' that track their learning skills

The Outcome Based Education (OBE) philosophy is *"Success for all students and staff"* by

- **Ensuring that all students are equipped with the knowledge, competence, and qualities needed to be successful after they exit the educational system.**
- **Structuring and operating institutions so that those outcomes can be achieved and maximized for all students.**

2. INSTITUTE VISION AND MISSION

Vision of the Institute

To be an institute known for its Values, Academic Excellence & Research and Nurturing Professionals for their “Career” and “Life

Mission of the Institute

- M1** To establish and provide state-of-the-art environment for real and lifelong learning
- M2** To provide education focused for deep knowledge, interpersonal skills and leadership
- M3** To conduct impactful research for addressing challenges of the society
- M4** To establish and strengthen collaboration between academia and industry
- M5** To develop competent professionals with ethical and social responsibility

3. DEPARTMENT VISION AND MISSION

Vision of the Department

Nurturing Professionals for their “Career” and “Life” through deep knowledge in Computer Science, Research & Ethical Values.

Mission of the Department

- M1** To impart theoretical foundation and practical skills for the design & development of software systems and solution of engineering problems.
- M2** To prepare students for emerging trends in computer and related areas.
- M3** To cultivate entrepreneurial skills, leadership qualities, and ethical values among the students.
- M4** To develop research interest amongst faculty and students by providing the desired environment.

4. Program Educational Objectives (PEOs), Program Outcomes (POs) and Program Specific Outcomes (PSOs)

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.

5. STATEMENTS OF PEOs, POs AND PSOs

5.1. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Program Educational Objective (PEOs) of the Department

- PEO1** To design, analyze and synthesize information in the field of computer science relating to IT industrial applications and research.
- PEO2** To produce entrepreneurs and professionals by meeting-out future technological needs.
- PEO3** To nurture professional & ethical attitudes for addressing the needs of society.

5.2 PROGRAM OUTCOMES (POs)

- PO-1. Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO-2. Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- PO-3. Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO-4. Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions for complex problems:
- ✓ That cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline as against problems given at the end of chapters in a typical text book that can be solved using simple engineering theories and techniques
 - ✓ That may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions
 - ✓ That requires consideration of appropriate constraints / requirements not explicitly given in the problem statement such as cost, power requirement, durability, product life, etc.
 - ✓ Which need to be defined (modelled) within appropriate mathematical framework and.
 - ✓ That often requires use of modern computational concepts and tools, for example, in the design of an antenna or a DSP filter.

- PO-5. Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO-6. The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO-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.
- PO-8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO-9. Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO-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.
- PO-11. Project Management & 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.
- PO-12. Life-Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

5.3. PROGRAM SPECIFIC OUTCOMES (PSOs)

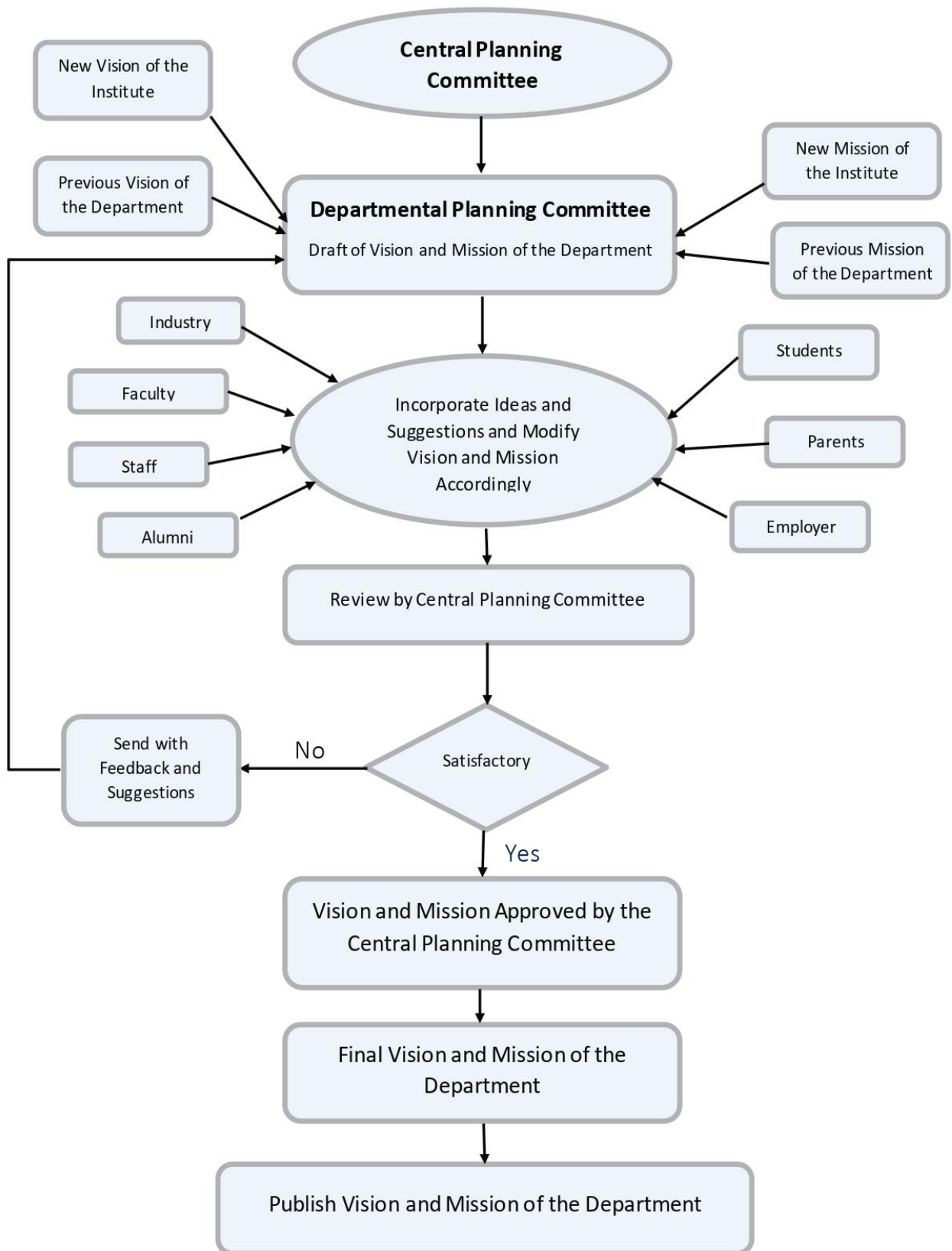
The graduates of the department will attain:

- PSO1.** Ability to demonstrate basic knowledge of Database System, Software Engineering, Computer Hardware and Networking and Operating System for Software Applications.
- PSO2.** Ability to Design & Develop Program, Algorithms and Projects using efficient Data Structure.
- PSO3.** Ability to apply their skills in the field of web designing, cloud computing, machine learning, artificial intelligence and data analytics.

5.4. Vision, Mission & PEO are published & disseminated at following places:

Vision, Mission & PEO			
Sr. No.	Place of Dissemination	Item	Dissemination Details
1	College Website	Vision, Mission, PEO	Permanent
2	Department Area	Vision, Mission, PEO	Permanent
3	Laboratory Area	Vision, Mission, PEO	Permanent
4	Notice Boards	Vision, Mission	Permanent
5	Employer Survey Form	Vision, Mission, PEO	When Required
6	Bulk SMS	Vision, Mission	At New Admission
7	Email	Vision, Mission	Footer in every Mail
8	Home Page of ERP	Vision, Mission	Permanent
9	Laboratory Manuals	Vision, Mission	Permanent
10	Faculty Meetings	Vision, Mission, PEO	At Regular Interval (Bi Monthly)
11	Background of all Computers in the Department	Vision, Mission	Permanent
12	In Alumni Interactions	Vision, Mission, PEO	Alumni Meet
13	Display Device (TV)	Vision, Mission, PEO	Permanent

5.5. Process for Updating the Vision and Mission of the Department



The Process for Updating Vision and Mission of the Computer Science and Engineering Department

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

Step 1: The Vision & Mission of the Institute is taken as the basis.

Step 2: The Department conducts brain-storming sessions with the faculty on the skill-set required by the local and global employers, Industry Advances in Technology and R & D and the draft copy of the Vision and Mission of the Department is drafted as advised by the Central Planning Committee.

Step 3: The views from Parents, Professional Bodies, Industry representatives and Departmental Planning Committee are also collected and incorporated to revise the draft version based on their inputs.

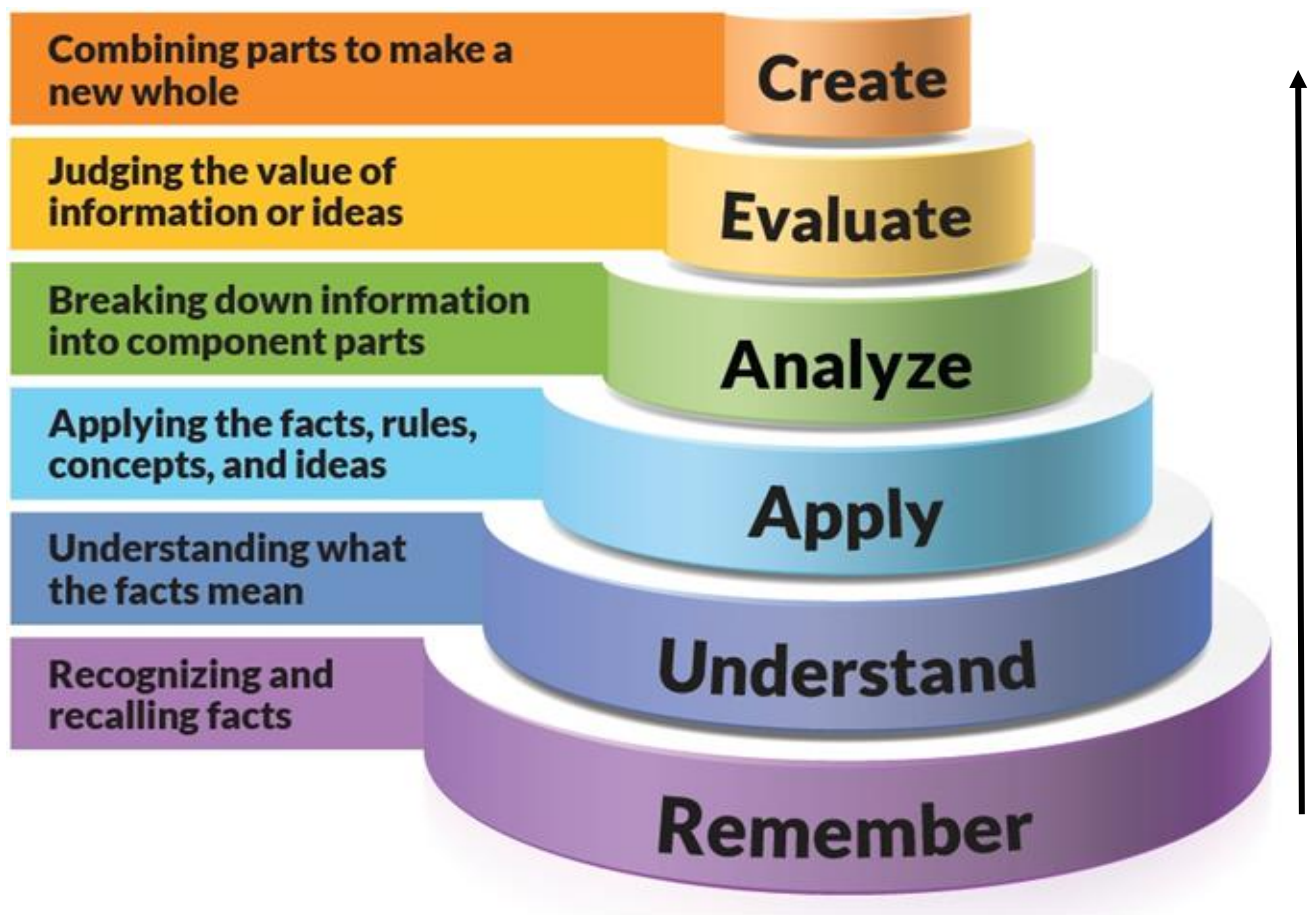
Step 4: The accepted views are analyzed and reviewed to check the consistency with the vision and mission of the institute.

Step 5: If the Central Planning Committee is not satisfied with the Vision and Mission than it will again send for modification to the Department Planning Committee.

Step 6: If the Vision and Mission is satisfactory as per the requirements of Central Planning Committee then it is approved and published among the stakeholders.

6. 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.



Blooms Taxonomy

Cognitive Process 1: To Remember

Remembering consists of recognizing and recalling relevant information from long-term memory.

Verbs associated with this level:

Choose, define, describe, find, identify, label, list, locate, match, name, recall, recite, recognize, record, relate, retrieve, say, select, show, sort and tell

Cognitive Process 2: To understand

Understanding is the ability to make your own meaning from educational material such as reading and teacher explanations. The sub-skills for this process include interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.

Verbs associated with this level:

Categorize, clarify, classify, compare, conclude, construct, contrast, demonstrate, distinguish, explain, illustrate, interpret, match, paraphrase, predict, represent, reorganize, summarize, translate and understand

Cognitive Process 3: To apply

Applying refers to using a learned procedure either in a familiar or new situation.

Verbs associated with this level:

Apply, carry out, construct, develop, display, execute, illustrate, implement, model, solve and use

Cognitive process 4: To Analyze

To analyze is to break material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose. Students analyze by differentiating, organizing, and attributing.

Verbs associated with this level:

Analyze, ascertain, attribute, connect, deconstruct, determine, differentiate, discriminate, dissect, distinguish, divide, examine, experiment, focus, infer, inspect, integrate, investigate, organize, outline, reduce, solve (a problem) and test for

Cognitive Process 5: To evaluate

To evaluate is to make judgments based on criteria and standards.

Verbs associated with this level:

Appraise, assess, award, check, conclude, convince, coordinate, criticize, critique, defend, detect, discriminate, evaluate, judge, justify, monitor, prioritize, rank, recommend, support, test, value

Cognitive Process 6: To Create

To create is to put elements together to form a coherent or functional whole; reorganize elements into a new pattern or structure; inventing a product. This skill involves putting things together to make something new. To accomplish creating tasks, learners generate, plan, and produce.

Verbs associated with this level:

Adapt, build, compose, construct, create, design, develop, elaborate, extend, formulate, generate, hypothesize, invent, make, modify, plan, produce, originate, refine, transform

Ref: Anderson, L. W., et al. (2001). A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. New York: Longman. Bloom, B. S., et al. (1956). The Taxonomy of Educational Objectives: Handbook I, Cognitive Domain. New York: David McKay.

The following charts lists **examples of each Cognitive Processes**

Cognitive Processes	Examples
Remembering: <i>To recognize and recall relevant information from long-term memory.</i>	
Recognizing	<ul style="list-style-type: none"> ▪ Identify input devices from the list of devices. ▪ Answer any true-false or multiple-choice questions.
Recalling	<ul style="list-style-type: none"> ▪ Name the three super computers ▪ List the arithmetic operators in increasing order of precedence. ▪ Reproduce the Blooms Taxonomy
Understanding: <i>It is the ability to make your own meaning from educational material such as reading and teacher's explanations.</i>	
Interpreting	<ul style="list-style-type: none"> ▪ Draw a Block diagram of the computer system.
Exemplifying	<ul style="list-style-type: none"> ▪ Read the following program and figure out the possible output.
Classifying	<ul style="list-style-type: none"> ▪ What is coupling, and why should you have weak coupling? Explain.
Summarizing	<ul style="list-style-type: none"> ▪ For the given source code for a class.
Inferring	<ol style="list-style-type: none"> a) Identify the constructor(s) defined in this class by writing constructor signatures.
Comparing	<ol style="list-style-type: none"> b) Write a statement that would instantiate (create) an object using the constructor(s) that they have identified.
Explaining	<ol style="list-style-type: none"> c) Write any additional Java code that would help clarify the data type of any variables involved.
Applying: <i>It refers to using a learned procedure either in a familiar or new situation.</i>	
Executing	<ul style="list-style-type: none"> ▪ Write a procedure to place the numbers from a given array into the other arrays
Implementing	<ul style="list-style-type: none"> ▪ Evaluate the expression: $2 + 4 / 7 * 5 \% 3 == 7$
Analyzing: <i>This is to break material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose. Students analyze by differentiating, organizing, and attributing.</i>	
Differentiating	Find the errors in the given code segment.
Organizing	
Attributing	
Evaluating: <i>This is to make judgments based on criteria and standards.</i>	
Checking	Discuss, giving reasons, which type of search would be best for the given array
Critiquing	
Creating: <i>To create is to put elements together to form a coherent or functional whole; reorganize elements into a new pattern or structure; inventing a product. This skill involves putting things together to make something new. To accomplish creating tasks, learners generate, plan, and produce.</i>	
Generating	<ul style="list-style-type: none"> ▪ Reconstruct the Select Case block in a fragment of code so that all elements of two arrays are merged into the third array
Planning	

Producing

- Write a method `get24HourTime()` which accepts three parameters and returns a `String`. The three parameters are an `int` representing the hour value, an `int` representing the minute value and a `String` which is either “am” or “pm”. The method returns a `String` representing the time as a 24-hour time value. For example, 2:35pm is “14:35” in 24-hour time.

7. 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.

7.1 SAMPLE CO STATEMENTS

Course Name: WEB TECHNOLOGIES

Year of Study: 2019-2020

AKTU Course Code: RCS-052:

CO No.	Statement
C052.1	To understand the basic concepts of Internet, protocols and Java programming.
C052.2	To develop static web pages by the use of HTML, CSS, DHTML and fast data access using XML.
C052.3	To design and validate Forms using JavaScript and reduce server load using AJAX. Also understand the concepts of Socket Programming in Java and design client server application.
C052.4	Understand the concept of EJB and to establish the connection between java application and Database using JDBC to performs DML and DDL operations on database.
C052.5	Developing dynamic web application using Servlet and JSP on Apache Tomcat Server.

8. CO-PO AND CO-PSO MAPPING OF COURSES

All the courses together must cover all the POs and PSOs.

For a course we map the COs to POs through the CO-PO matrix and to PSOs through the CO-PSO matrix as shown below.

The various correlation levels are levels 1, 2 or 3 as defined below:

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

4: put “- “If there is no correlation

8.1. 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 (COs) are the statements that declare what students should be able to do at the end of a course. are defined by Accreditation Agencies of the country (NBA in India), POs 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 (POs) 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 (**PSOs**) are the statements that assert what the graduates of a specific engineering program should be able to do.

Program Educational Objectives (**PEOs**) are the broad statements which describe in detail about the career and professional accomplishments after significant years of graduation that the program prepares the graduates to achieve.

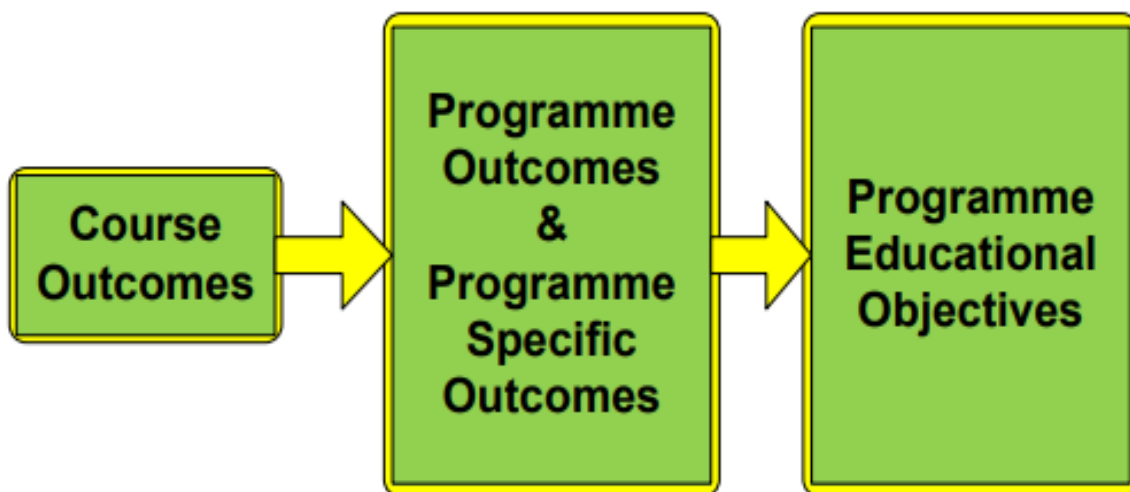


Figure 8.1: Relating the outcomes (CO-PO and PSO-PEO)

Figure 8.1 shows the building block of CO-PO and PSO-PEO relationship. 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 8.2.

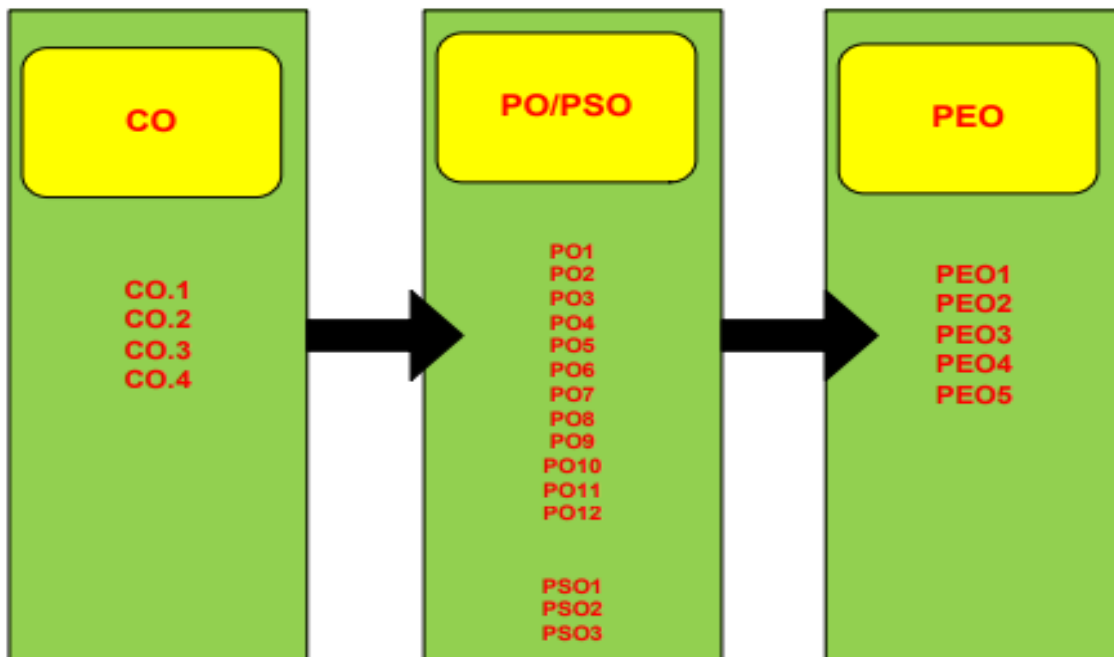


Figure 8.2: Relationship between CO, PO & PSO and PEO

8.2 Process involved in CO-PO Mapping

The role of CO-PO mapping will be assigned to the faculty as per hierarchy followed in figure 7.3. After the course (subject) allotment from the department, the course in-charge of the course has to write appropriate COs for their corresponding course. It should be narrower and measurable statements. By using the action verbs of learning levels, CO's will be designed. CO statements should describe what the students are expected to know and able to do at the end of each course, which are related to the skills, knowledge and behavior that students will acquire through the course.

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

8.3 SAMPLE CO-PO AND CO-PSO MAPPING

Course Name: Web Technologies
Course Code: 052

Year of Study: 2019-2020
AKTU Course Code: RCS052

<u>CO-PO Matrix</u>												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	-	-	-	-	-	-	-
CO2	3	2	2	-	3	-	-	-	-	-	-	-
CO3	3	-	2	-	3	-	-	-	-	-	-	-
CO4	2	-	3	-	3	-	-	-	-	-	-	-
CO5	3	3	3	-	3	1	-	-	-	-	-	-
Average of CO's for PO's	2.80	2.33	2.40	3.00	2.80	1.00	-	-	-	-	-	-

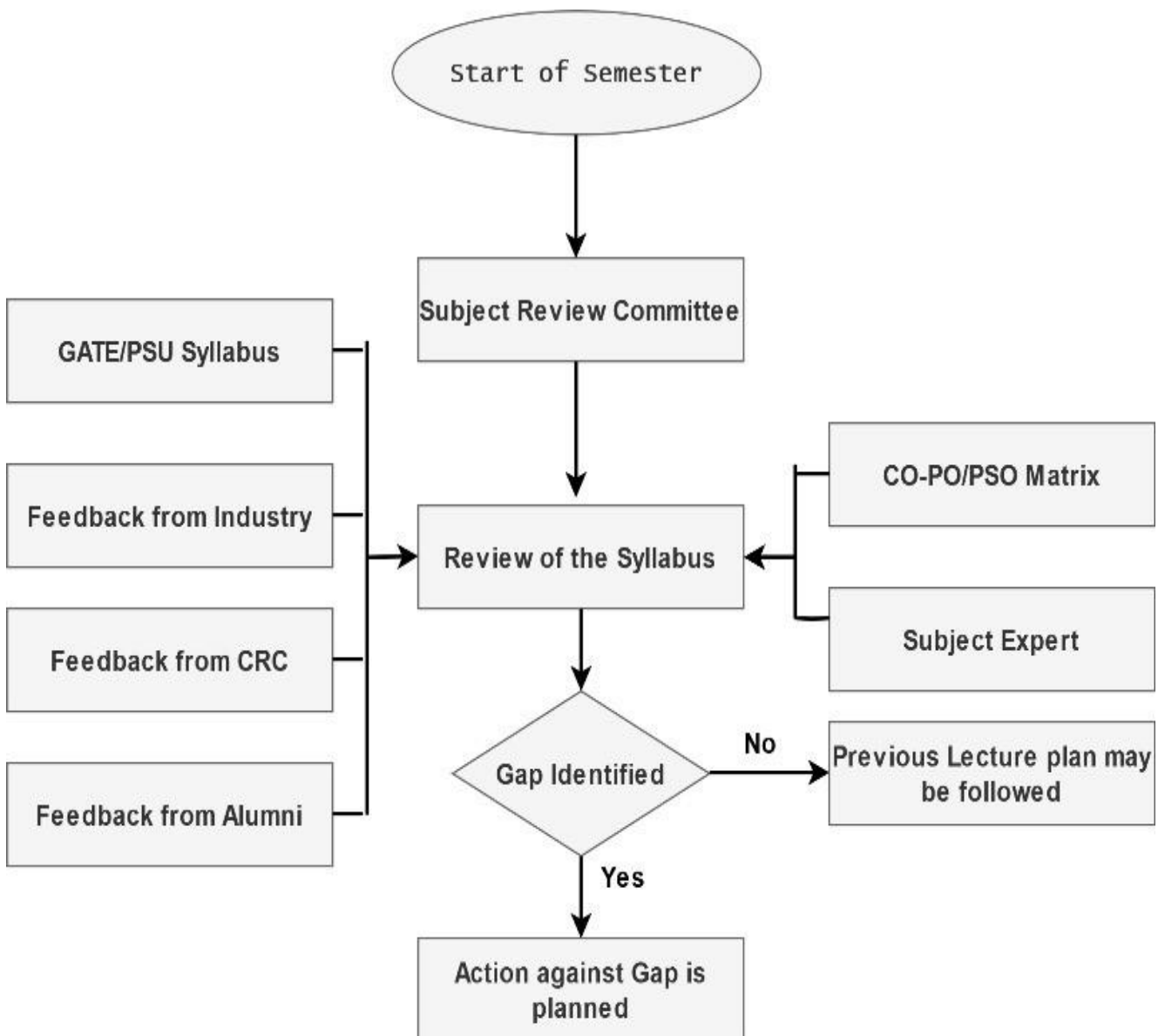
<u>CO-PSO Matrix</u>			
CO/PSO	PSO1	PSO2	PSO3
CO1	-	1	1
CO2	-	3	3
CO3	-	3	3
CO4	-	3	3
CO5	-	3	3
Average of CO's for PSO's		2.60	2.60

8.4 Process to identify the curricular gaps to the attainment of COs / POs

A subject review committee is constituted under the chairmanship of the Head of the department. The committee takes inputs from:

<ul style="list-style-type: none"> ▪ Deviation of CO-PO/PSO Matrix ▪ GATE/PSU ▪ Syllabus Input from Subject Expert 	<ul style="list-style-type: none"> ▪ Feedback from CRC ▪ Feedback from Industry ▪ Feedback from Alumni
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Based on the inputs the committee identifies the gaps. If no gap is identified the proposed lecture plan is followed, else suitable action is been taken to fulfill the identified gaps. The process is explained in the following flow chart:



Sample of Identified Curriculum Gaps Year 2019-20

1. Personality Skill Development and Competitive Ability such as Coding, Verbal Ability, English, Quants, and Reasoning & Presentation Skills can be included (specially for placement point of view) in AKTU curriculum [PO-2, PO-10].
2. Digital Electronics subject should be included for better understanding of Computer Organization [PO-1, PO-2, PO-3].
3. Subject Technical Communication (KAS 301) must be included for inculcating professionalism in students. Also, there should be lab including the following assignments for students: [PO-10]
 - Gathering Ideas and Information: Organizing Ideas relevantly & coherently
 - Engaging in debates and participating in Group Discussions
 - Facing Interviews, Writing Project Proposals / Technical Reports
 - Making Oral Presentations
 - Writing Formal Letters and Essays
 - Transferring Information from Non-Verbal to Verbal Texts and Vice Versa
 - Taking Part in Social and Professional Communication
4. Nowadays some elective subjects are very important like Cloud computing. Hence a bunch of students gets deprived of this technology. [PO-2 PO-3 PO-5 PO-11 PSO-3]
5. Network and Security in the Syllabus of Cyber Security PO-2 PO-3 PO-5 PO-11 PSO-3].
6. Python with Django Training should be included in curriculum as only basic Python Programming is covered in the syllabus. [PO-2, PO-3, PO-5, PO-6, PO-9, PO-11, PSO-3]

Following Subjects/Technologies are missing in the curriculum:

1. Presentation and Communication Skills [PO-10]
2. Additional Programming Skills such as Python with Django, PHP, R Language, etc. [PO-2 PO-3 PO-5 PO-6 PO-9 PO-11 PSO-3]
3. Industry Specific Skills (Android, Big Data, Software Testing, Cloud Computing, IoT, Web-Based Tools, etc) [PO-2 PO-3 PO-5 PO-11 PSO-3]
4. Technical Subjects Special Classes, which are important for company interviews such as C, Data Structure, Operating Systems, DBMS, Networks, OOPs, etc. [PO-1 PO-2 PO-3 PO-4 PO-5 PSO-1]
5. Confidence Building and Career Based Counseling [PO-10]
6. Project Development and Report Writing [PO-9 PO-11]

9. COURSE OUTCOMES TO PO AND PSO MAPPING

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.

SAMPLE COURSE-PO AND COURSE-PSO MAPPING

PO Attainment

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C101	2.06	2.81	1.17	1.12	0	0	0	0	0	0	0	2.06
C102	3	2.4	0	2	0	0	0	0	0	0	0	0
C103	2.87	2.29	2.87	0	0	2.87	0	0	1.91	0	0	0
C104	2	1.4	0	0	1.75	0	0	0	3	2	0	0
C105	3	2	3	1	3	0	0	0	3	0	0	1
C106	3	2.4	2.2	1	0	1.75	0	0	1.25	1	1.5	2
C107	2.15	1.14	1.19	1.43	0.95	0.95	0.95	0	0	0	0	1.19
C108	2.98	1.99	0	0	0	0	0	0	0	0	0	0
C109	3	3	2	1.6	1	0	0	0	0	0	0	2
C110	0	0	0	0	0	0.98	0	1.96	1.96	2.94	1.96	2.74
C111	1	1	1	1	1	1	0	0	0	0	0	0
C112	1	3	2	1.6	2	0	0	0	1	0	0	1
C113	2.6	1.33	1.8	1	2.2	0	0	0	1	0	0	1
C201	0.93	0.91	0.52	0.52	1.04	0.52	0	0	0	0.52	0	0
C202	0	0	0	0	0	0.53	0	1.05	1.05	1.58	0.53	1.47
C203	0.87	0.87	0.87	0	0.58	0	0	0	0.29	0	0	0.58
C204	1.41	1.41	1.41	1.1	0.94	0	0	0	0	0	0	0.94
C205	0.52	0.52	0.45	0.35	0.39	0	0	0	0	0	0	0
C206	3	3	3	1	2	0	0	0	2	0	0	1
C207	3	2.4	2	1.6	1.8	0	0	0	0	0	0	2
C208	3	2	1.6	1.75	2.4	0	0	0	0	0	0	0
C209	1.8	2.2	2.2	1.33	1.6	1.33	1.33	2	2	1.67	2	2
C210	0.66	0.6	0.6	0	0.6	0	0	0	0	0	0	0
C211	2	1.2	1.8	1.8	1.2	2	0	0	1.33	0	2	1.67
C212	0	1	1	1	0	1	1.67	1.60	2	1	1	1.33
C213	0.84	0.83	0.75	0.75	0.9	0	0	0.3	0.3	0	0	0.6
C214	1.12	2.56	2.88	2.24	0	0	0	0	0	0	0	0
C215	2.69	1.92	1.76	1.34	2.88	0	0	0	2.88	0	0	0
C216	3	3	2.6	2.6	2.4	0	0	0	0	0	0	2
C217	2.75	1.75	2	1.5	2	0	0	0	0	0	0	2.25
C218	2.2	2	2	0	1.2	0	0	0	0	0	0	0
C219	1.98	1.8	1.8	2.4	1.5	2.48	0	1.8	0	1.8	0	0
C301	0.86	1.07	1.19	0	1.07	1.28	1.07	1.43	1.43	0	1.57	0.95
C302	1.84	1.53	1.38	1.84	1.84	0.92	1.84	0.92	1.15	0.92	1.15	0.92
C303	1.44	1.44	1.8	1.26	1.44	1.44	0.72	0	0	0	0	0
C304	0.52	1.21	0.87	0	0	0	0	0	0	0	0	0
C305	1.4	1.21	1.21	0.75	0.58	0	0	0	0	0	0	0
C306	2.64	2.2	2.26	2.82	2.64	0.94	0	0	0	0	0	0
C307	1.33	2	3	1.8	1.75	0	0	0	0	0	0	0

C308	1.33	3	1.33	0	0	0	0	0	0	0	0	0
C309	3	2.4	2	2	1	0	0	0	0	0	0	0
C310	2.6	2.33	2.4	3	1.8	0	0	0	0	0	0	0
C311	0.92	1.15	1.28	0	1.15	1.23	1.15	1.53	1.28	0	1.23	1.02
C312	2.16	2.16	1.96	0.98	1.96	0	2.95	2.95	2.55	0	0	1.96
C313	2.2	2.67	2.6	2	2	2	0	0	0	2	0	0
C314	2.67	2.86	1.91	2.86	1.91	0	0	0	0	0	0	0
C315	2.94	2.94	2.94	2.94	2.94	0	0	0	0	0	0	1.96
C316	2.57	2.96	2.96	2.37	2.76	0	0	0	0	0	0	2.37
C317	2.25	2.67	2.5	2	2.5	1.75	0	0	0	2	0	0
C318	3	1.4	3	1.6	3	0	0	0	0	0	0	0
C319	3	3	3	3	3	0	0	0	0	0	0	0
C320	2.6	2.6	2.8	2.2	2.8	0	0	0	0	0	0	2.8
C401	0	0	2.37	0	0	2.17	2.57	2.57	2.57	2.77	2.77	2.97
C402	1.43	1.43	1.43	1.43	1.43	0.95	0.95	0	0	0	0	0
C403	2.5	2.16	2.88	1.73	1.92	0	0	0	0	0	0	0
C404	1.92	1.92	1.92	1.44	1.44	1.28	2.88	0	0	0	0	1.44
C405	2.06	1.6	1.37	2.06	2.06	0	0	0	0	0	0	0
C406	2	2	2	1.5	1.5	1.33	3	0	0	0	0	1.5
C407	3	2.33	2	3	3	0	0	0	0	0	0	0
C408	2.6	2.5	2.2	1.75	2.25	1.5	1.33	2	1.6	1.4	1.25	1.6
C409	3	2.4	2.2	3	2.8	1.67	2	1.5	2	2.5	3	2.5
C410	1.52	1.52	1.01	1.52	0	0	1.52	0	0	0	0	1.52
C411	2.94	2.94	2.94	2.94	2.94	0	0	0	0	0	0	1.96
C412	0.63	1.26	1.05	0.95	0.53	0	0	0	0	0	0	0
C413	2	0	2	2	0	0	0	0	0	3	0	3
C414	3	2.4	2.2	3	2.8	1.67	2	1.5	2	2.5	3	2.5

PO Attainment Level

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO Attainment	2.15	2.07	2.03	1.98	2.01	1.60	1.94	1.87	1.91	2.03	1.97	1.90
Direct Attainment	2.10	1.97	1.91	1.75	1.81	1.42	1.75	1.65	1.72	1.85	1.77	1.71
Indirect Attainment	2.34	2.45	2.53	2.9	2.8	2.34	2.68	2.77	2.65	2.75	2.75	2.68

PSO Attainment

Course	PSO1	PSO2	PSO3
C101	1.87	0	0.93
C102	0	0	2
C103	0	0	0
C104	0	0	0
C105	0	0	0
C106	0	0	0
C107	0.95	0	0.95
C108	0	0	0
C109	1	2	1

C110	0	0	0
C111	0	0	0
C112	1	3	2
C113	1.75	1.25	0
C201	1.04	0.52	0.52
C202	0	0	0
C203	0	0.87	0.87
C204	1.18	0	0
C205	0.53	0.35	0
C206	0	3	2
C207	2	0	0
C208	1.4	2.25	1.75
C209	1.4	2	1.8
C210	0	0.72	0.72
C211	0	0	2
C212	2.4	2	1.2
C213	0.72	0.83	0.72
C214	0	0.96	0.96
C215	1.73	1.92	0.96
C216	2.4	0	0
C217	2.25	1.5	0
C218	0	2.4	2.4
C219	2.4	1.8	2.52
C301	0	0	0
C302	0	0	0
C303	1.59	1.3	1.59
C304	0	1.13	0.87
C305	1.4	1.4	1.31
C306	0	2.45	2.45
C307	2.4	2.2	1.8
C308	0	2.4	2
C309	3	3	3
C310	0	2.6	2.6
C311	0	0	0
C312	1.77	1.57	1.77
C313	2.2	2.2	1.6
C314	2.86	2.86	2.86
C315	1.96	2.94	1.96
C316	0	2.37	2.37
C317	2.2	2	2
C318	1	1.8	0
C319	0	3	2
C320	2	2.8	2.8
C401	0	0	0
C402	0.95	1.24	1.43
C403	0.96	1.73	2.88

C404	1.92	2.88	1.6
C405	0	2.06	2.06
C406	2	2	2
C407	0	3	3
C408	2	2.6	2.4
C409	3	2.67	1.75
C410	0	0	0
C411	0	2.94	2.94
C412	0.53	1.05	1.05
C413	2	2	2
C414	3	2.67	1.75

PSO Attainment Level

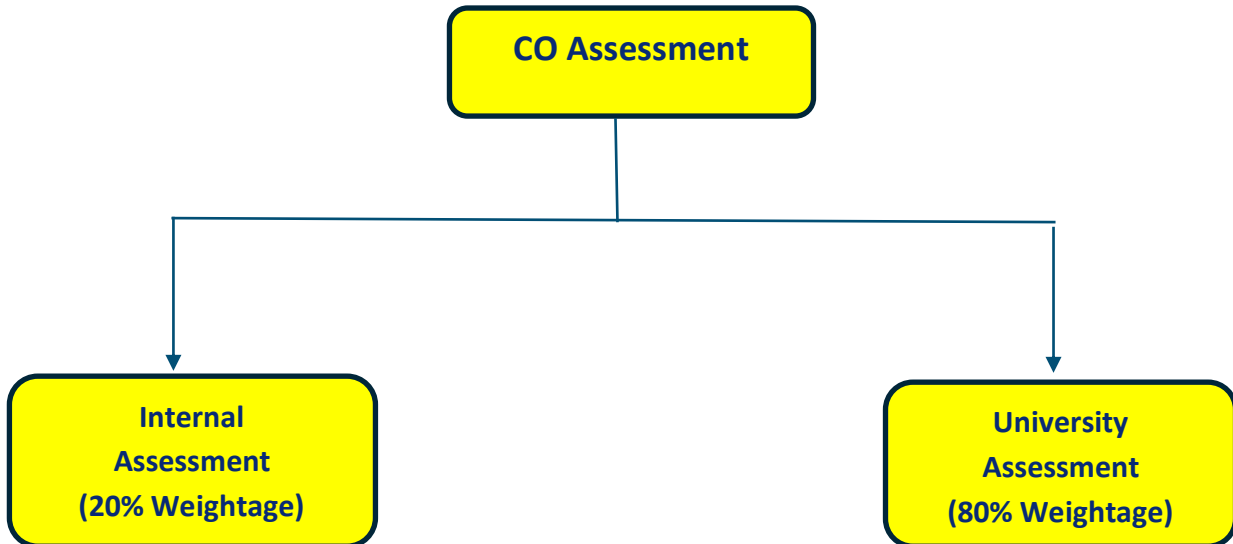
Course	PSO1	PSO2	PSO3
CO Attainment	1.98	2.13	2.01
Direct Attainment	1.75	2.00	1.81
Indirect Attainment	2.9	2.64	2.8

10. ASSESSMENT PROCESS

10.1 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

(i) CO Assessment Rubrics: CO Assessment



Course Outcome is evaluated based on the performance of students in internal assessments and in university examination of a course. Internal assessment contributes 20% and university assessment contributes 80% to the total attainment of a CO.

(ii) CO Assessment Tools

The description of Assessment tools used for the evaluation of program outcomes is given in Table 9.1. The various assessment tools used to evaluate COs and the frequency with which the assessment processes are carried out are listed in table 9.2. In each course, the level of attainment of each CO is compared with the predefined targets, if is not the course coordinator takes necessary steps for the improvement to reach the target. With the help of CO against PO/PSO mapping, the PO/PSO attainment is calculated by the program coordinator.

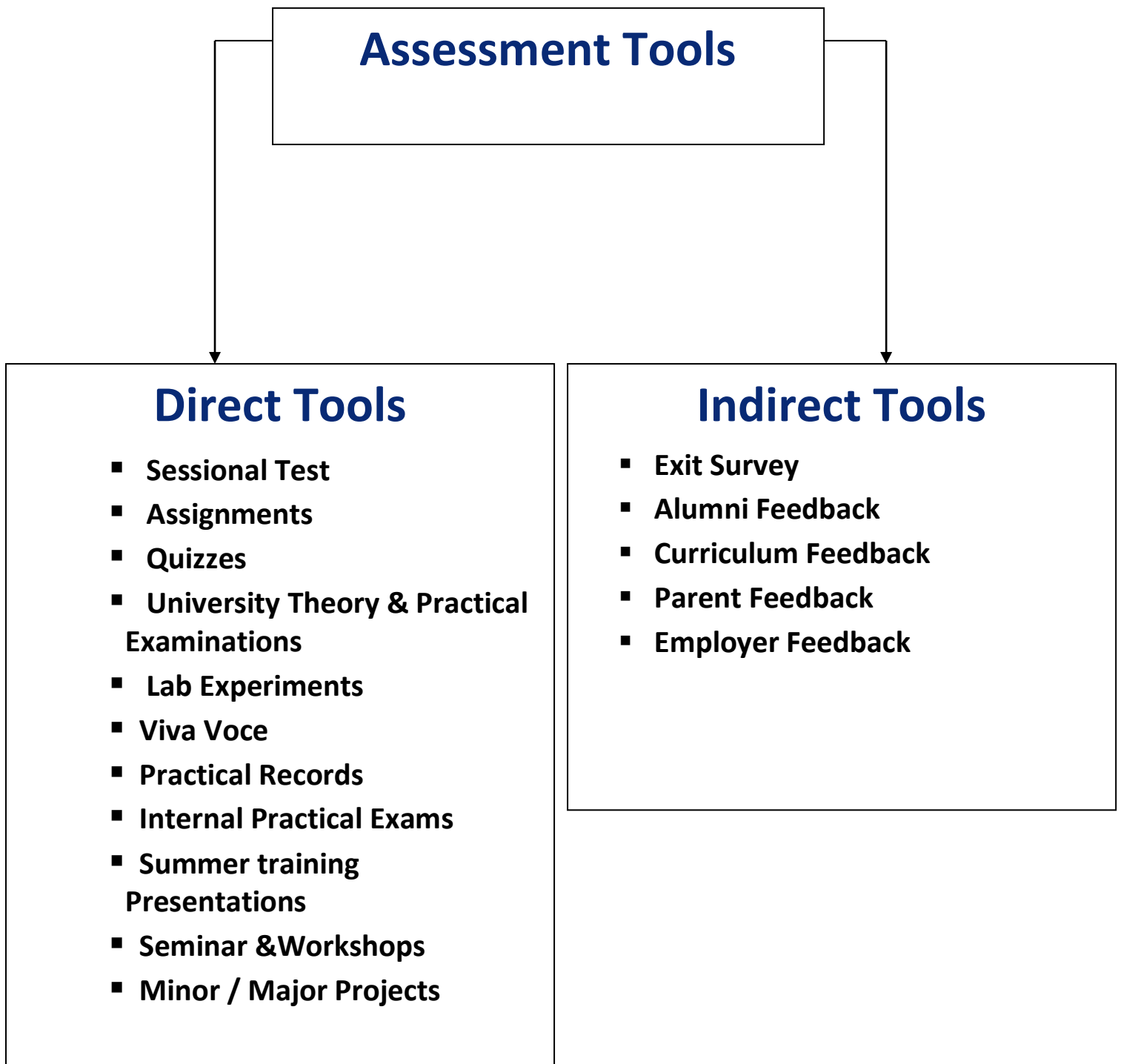
Assessment Process for calculating the attainment of POs and PSOs

Assessment Type	Assessment Method	Weightage	Assessment Period	Assessment and Reviewed by
Direct	Assessment Tools based on subject nature	80 % (70% of University Examination+30 % of the Assessment tools)	Once per semester	Department Advisory Committee
	AKTU Examination		Once per semester	
Indirect	Current Passing out Students Survey	20%	8th semester	Department Advisory Committee
	Recruiters survey		Every Placement Activity	
	Alumni survey		Once per year	

Direct and Indirect Assessment Method

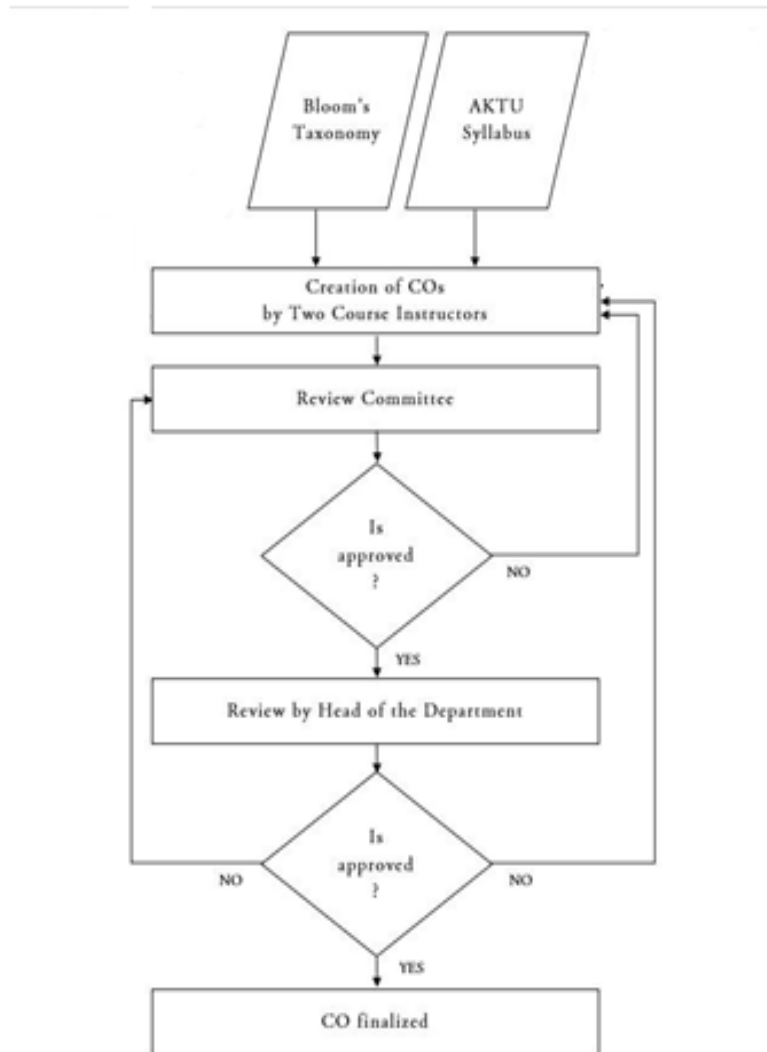
10.2 Assessment Process for Course Outcome Attainment

Assessment Tools are of two types and are as shown below



10.3 Assessment Process for evaluation of Course Outcomes

Assessment tools and its frequency, the responsible authority to collect the data and its relevant COs, are tabulated in tables



The evaluation process for achieving Course Outcomes takes place each semester.

10.4 Assessment Process for evaluation of Theory Courses

Assessment tools and its frequency, the responsible authority to collect the data and its relevant COs, are tabulated in tables

Assessment Process for evaluation of Theory Courses				
Assessment Tool	Assessment Period	Assessed By	Reviewed By	Mapping with CO
Sessional Test-1	Once per semester	Course Instructor	Department Advisory Committee	Relevant COs
Sessional Test-2				All Cos
Sessional Test-3				
Quiz 1	Once per semester	Course Instructor	Department Advisory Committee	CO 1
Quiz 2				CO 2
Quiz 3				CO 3
Quiz 4				CO 4
Quiz 5				CO 5
Assignment 1	Once per semester	Course Instructor	Department Advisory Committee	CO 1
Assignment 2				CO 2
Assignment 3				CO 3
Assignment 4				CO 4
Assignment 5				CO 5
University Semester Exam	Once per semester	AKTU	Department Advisory Committee	All Cos

10.5 Assessment Process for Laboratory Courses

Assessment Process for Lab Courses				
Assessment Tool	Assessment Period	Assessed By	Reviewed By	Mapping with CO
Lab Experiments	Throughout Semester	Course Instructor	Department Advisory Committee	All COs
Viva Voice	Throughout Semester	Course Instructor		All COs
Practical Record	Throughout Semester	Course Instructor		All COs
Internal Practical Exam	Once per semester	Internal Examiners		All COs
University Semester Exam	Once per semester	Internal examiners appointed by the department and External Examiners appointed by AKTU		All COs

10.6 Assessment Process for Project Courses

Assessment Process for Project Courses							
Assessment Tool		Assessment Period	Assessed By	Reviewed By	Mapping with CO		
Topic Approval		7 th Semester	Project Review Committee	Department Advisory Committee	All COs		
Progress Presentation 1	Presentation Skill	7 th Semester			Project Review Committee	Department Advisory Committee	All COs
	Viva Voce						
	Implementation						
	Faculty Interaction						
Progress Presentation 2	Presentation Skill	8 th Semester	Project Review Committee	Department Advisory Committee	All COs		
	Viva Voce						
	Implementation						
	Faculty Interaction						
Internal Final Presentation	Presentation Skill	8 th Semester	Project Review Committee	Department Advisory Committee	All COs		
	Viva Voce						
	Implementation						
	Report						
External Presentation	Presentation Skill	8 th Semester	Internal Examiners are appointed by the Department and External Examiners are appointed by AKTU	Department Advisory Committee	All COs		
	Viva Voce						
	Implementation						
	Report						

10.7 Assessment Process for MOOC Courses

Assessment Process for MOOC Courses				
Assessment Tool	Assessment Period	Assessed By	Reviewed By	Mapping with CO
Online Assignments	Throughout Semester	ICT Kanpur	AKTU	All COs
External Final Examination	Throughout Semester	AKTU	AKTU	All COs

10.8 Assessment Process for Seminar Courses and Industrial Training Courses

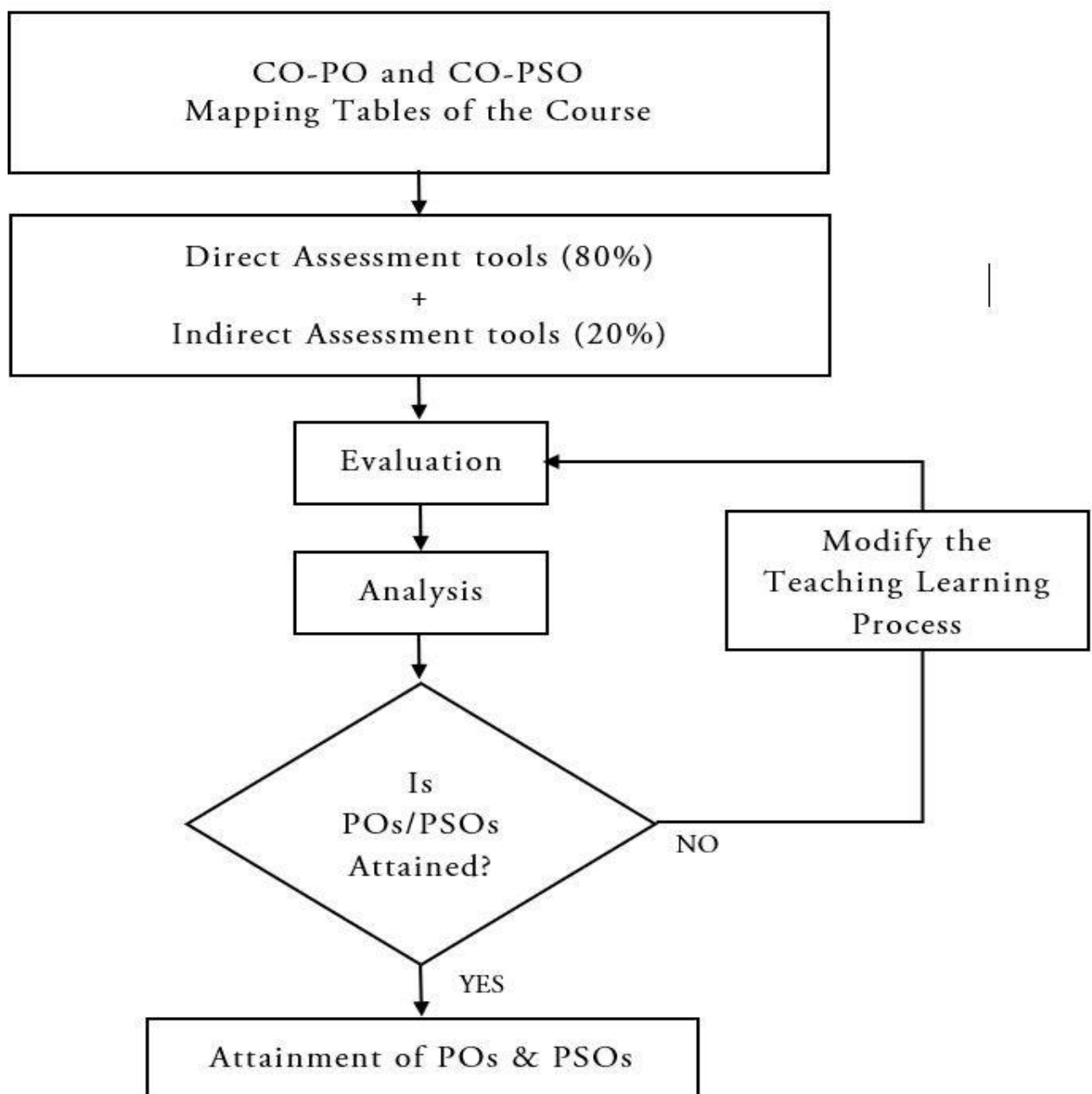
Assessment Process for Seminar Courses and Industrial Training Courses					
Assessment Tool		Assessment Period	Assessed By	Reviewed By	Mapping with CO
Presentation	Presentation Skill	Once per semester	Seminar Review Committee	Department Advisory Committee	All COs
	Viva Voice				
	PPT Slides				
	Implementation				
	Report				

10.9 Assessment Process for General Proficiency Course

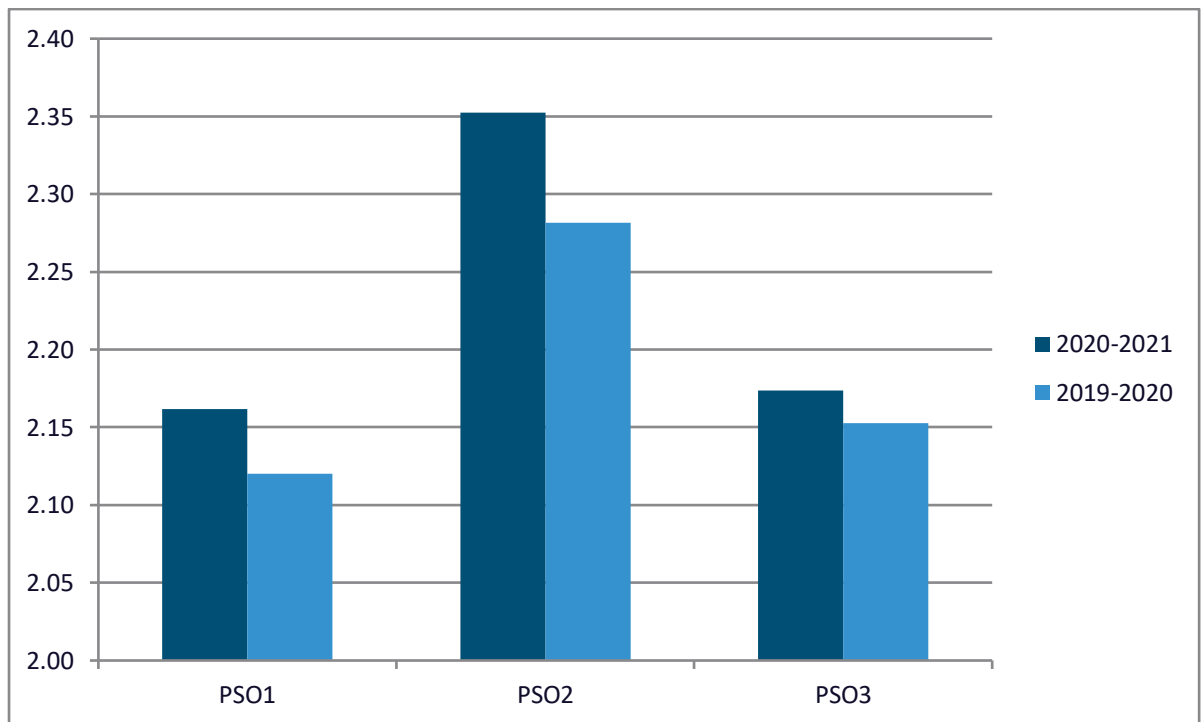
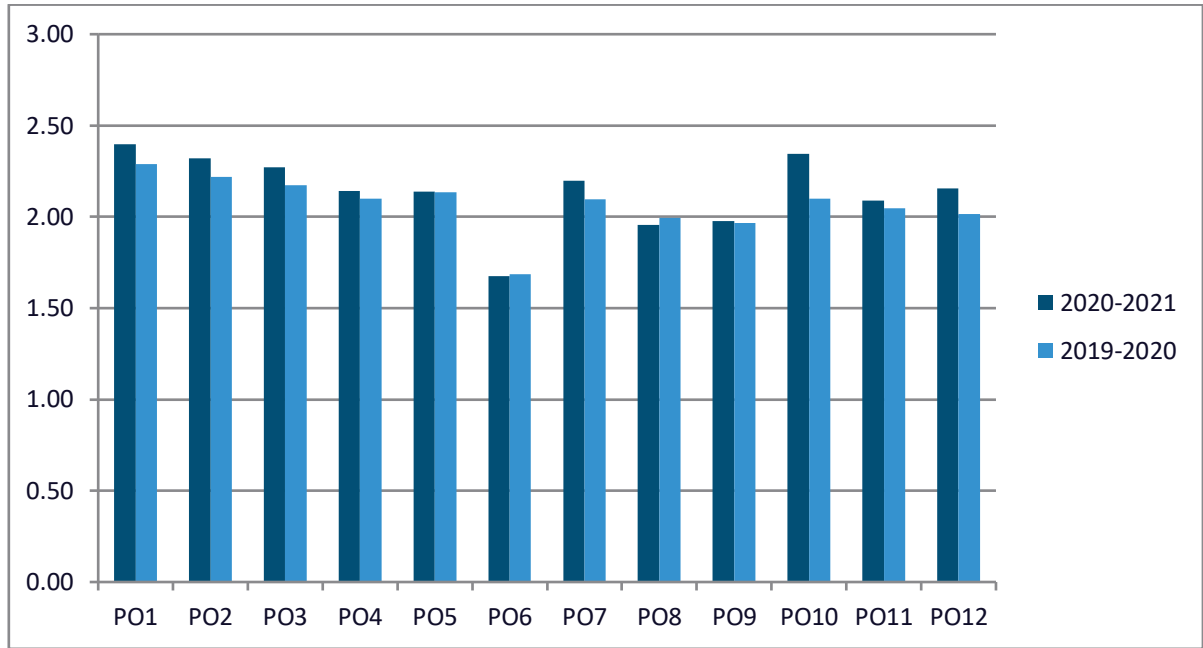
Assessment Process for General Proficiency Course				
Assessment Tool	Assessment Period	Assessed By	Reviewed By	Mapping with CO
Sports Events	Throughout the Program	Sports Committee	Department Advisory Committees	CO 1
Cultural Events		Cultural Committee		CO 2
Technical		Technical Committee		CO 3
Societal and Environmental		Societal and Environmental Committee		CO 4
Discipline		Proctorial Committee		CO 5

11. Assessment tools and processes used for measuring the attainment of each of the Program Outcomes and Program Specific Outcomes

All the theory and practical courses are directly related/mapped with PO's and PSO's. Achieving course attainment is the direct way of accomplishing PO's and PSO's. Performance in various courses reflects the extent of achievement of PO's and PSO's. The above-detailed process is displayed above in 10.1 to 10.8. The various direct and indirect tools and its frequency, the responsible authority to collect data for assessing the attainment of each PO, and PSO are given in below Table.



11.1 PSO attainment for year of study 2019-2020



11.2 Sample PO Attainment

Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C101	2.15	2.93	1.22	1.17								2.15
C102	2.77	2.21		1.84								
C103	2.84	2.28	2.84									
C104	2.86	2.86	1.9	1.52	0.95							1.9
C105	2.04	2.04	1.67	1.39	1.86							1.86
C106	2	1.4			1.75							
C107	3	2.6	2.6	1.8								
C108	1	3	2	1.6	2				1			1
C109	2.6	1.33	1.8	1	2.2				1			1
C110						2.46		1.38	2.58	2.77	1.84	2.58
C111	1.96	1.17	1.17	1.37	0.98							1.17
C112	2.86	2.48	2.1	2.1								
C113	2.52	2.91	2.33	1.75								
C114	2.2	2.54	2.03	1.86								
C115	2.36	2.36	2.36		1.57		2.36		2.36		1.57	1.57
C116	1	1	1	1	1	1						
C117	3	2.8	3	2					2			2
C118	2	1.8	2	2.2								
C119	3	2.4	2.2	1		1.75			1.25	1	1.5	2
C120						1.98		2.31	2.78	2.98	0.99	2.58
C201	2.72	2.72	2.72	2.72	1.81		1.81					
C202						0.97		1.94	1.94	2.92	1.94	2.72
C203	2.89	2.89	2.89		1.93				0.96			1.93
C204	2.21	2.21	2.21		1.47				0.74			1.47

C205	2.88	2.88	2.49	1.92	2.11							
C206	3	3	3	1	2				2			1
C207	3	2.4	2	1.6	1.8							2
C208	3	2	1.6	1.75	2.4							
C209	1.8	2.2	2.2	1.33	1.6	1.33	1.33	2	2	1.67	2	2
C210	0.98	0.89	0.89	1.19	0.74	1.22		0.89		0.89		
C211	1.9	1.14	1.71	1.71	1.14	1.9			1.27		1.9	1.59
C212		0.97	0.97	0.97		0.97	1.62	1.55	1.94	0.97	0.97	1.29
C213	2.14	2.1	1.91	1.91	2.29			0.76	0.76			1.53
C214	1.12	2.56	2.88	2.24								
C215	2.62	1.87	1.68	1.31	2.81				2.81			
C216	3	3	2.6	2.6	2.4							2
C217	2.75	1.75	2	1.5	2							
C218	2.2	2	2		2							
C219	2.2	2	2		2							
C301	1.94	1.94	2.33	1.75	0.97	0.97						
C302	2.69	2.88	1.92	2.88	1.92							
C303	1.15	2.69	1.92									
C304	2.23	1.93	1.93	1.63	1.78	1.04	1.49	0.74		2.23	0.74	0.74
C305	1.93	1.45	1.45	2.89	1.93				1.93			
C306	1.2	2	2.8	1.8	1.6							
C307	3	1.4	3	1.6	3							
C308	1.33	3	1.33									
C309	1.8	2.2	2.2	1.33	1.6	1.33	1.33	2	2	1.67	2	2
C310						2.1	2.38		2.86	2.38	2.38	2.29
C311	2.84	2.46	2.46	1.9								1.9
C312	2.7	2.25	2.32	2.89	2.7	0.96						

C313	2.07	2.26	2.45	1.88	1.88					1.88		
C314	2.8	2.8	2.6	2.6	2.8							2.6
C315	3	3	3	3	3							2
C316	3	3	3		2		3		1	3		2
C317	3	2			2				1			2
C318	3	2	2	1.8	2							
C319	2.6	2.33	2.4	3	1.8							
C320	2.2	2.5	2.4	2	2.5							
C321							2.67	2.67	2.86	2.86	2.86	2.86
C401			2.23			2.05	2.42	2.42	2.42	2.6	2.6	2.79
C402	2.82	2.82	2.82	2.82	2.82	1.88	1.88					
C403	2.46	2.13	2.84	1.7	1.89							
C404	1.87	1.87	1.87	1.4	1.4	1.25	2.81					1.4
C405	2.09	1.63	1.39	2.09	2.09							
C406	2	2	2	1.5	1.5	1.33	3					1.5
C407	3	2.33	2	3	3							
C408	2.6	2.5	2.2	1.75	2.25	1.5	1.33	2	1.6	1.4	1.25	1.8
C409	3	2.4	2.2	3	2.8	1.67	2	1.5	2	2.5	3	2.5
C410						1.99	2.74	2.99	2.99	2.99		2.99
C411	2.99	2.99	1.99	2.99			2.99					2.99
C412	2.99	2.59	2.59	2.99	1.99	1.99	1		1		1.99	1.99
C413	2.99	2.99	2.99	2.99	2.99							
C414	2.99	2.99	2.99	2.99	2.99							2.99
C415	1.19	2.39	1.99	1.79	1							
C416	2		2	2						3		3
C417	3	2.4	2.2	3	2.8	1.67	2	1.5	2	2.5	3	2.5

11.3 Sample PO Attainment Level

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO Attainment	2.39	2.27	2.17	1.97	2.00	1.54	2.11	1.78	1.82	2.22	1.91	2.00
Direct Attainment	2.42	2.51	2.67	2.83	2.71	2.24	2.53	2.68	2.59	2.84	2.79	2.76
Indirect Attainment	2.40	2.32	2.27	2.14	2.14	1.68	2.20	1.96	1.98	2.35	2.09	2.16

11.4 Sample PSO Attainment

Course Code	PSO1	PSO2	PSO3
C101	1.95		0.98
C102			
C103			
C104	0.95	1.90	0.95
C105		1.86	2.23
C106			
C107			
C108	1.00	3.00	2.00
C109	1.75	1.25	
C110			
C111	0.98		0.98
C112			
C113			
C114			
C115			2.36

C116			
C117			
C118			
C119			
C120			
C201	2.72		2.72
C202			
C203		2.89	1.93
C204		2.21	1.47
C205	2.88	1.92	0.96
C206		3.00	2.00
C207	2.00		
C208	1.40	2.25	1.75
C209	1.40	2.00	1.80
C210	1.19	0.89	1.24
C211			1.90
C212	2.33	1.94	1.16
C213	1.83	2.10	1.83
C214		0.96	0.96
C215	1.68	1.87	0.94
C216	2.40		
C217	2.25	2.25	
C218		2.40	2.40
C219		2.40	2.40
C301	2.13	1.75	2.13
C302	2.88	2.88	2.88
C303	2.49	1.92	

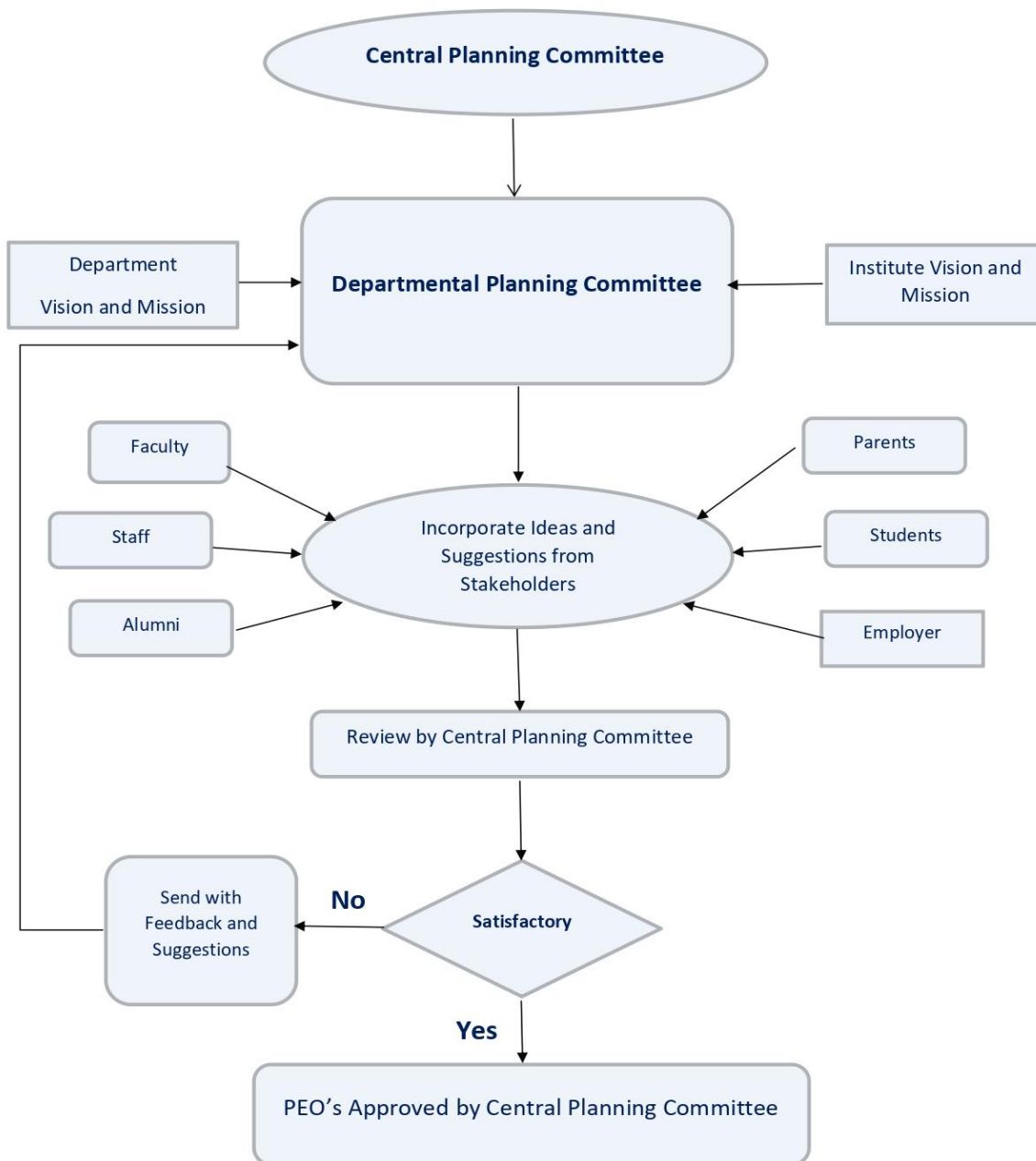
C304	1.93	1.78	1.49
C305	1.93	1.69	1.29
C306	2.40	2.20	1.80
C307	1.00	1.80	
C308		2.40	2.40
C309	1.40	2.00	1.80
C310			
C311			
C312		2.51	2.51
C313	2.07	2.07	1.51
C314	2.00	2.80	2.80
C315		3.00	3.00
C316	3.00	3.00	
C317			
C318			
C319		2.60	2.60
C320	2.20	2.00	2.00
C321			
C401			
C402	1.88	2.44	2.82
C403	0.95	1.70	2.84
C404	1.87	1.81	1.56
C405		2.09	2.09
C406	2.00	2.00	2.00
C407		3.00	3.00
C408	2.00	2.60	2.40
C409	3.00	2.67	1.75

C410			
C411			
C412	1.99	2.99	2.99
C413		2.99	2.99
C414	2.99	2.99	2.99
C415	1.00	1.99	1.99
C416	2.00	2.00	2.00
C417	3.00	2.67	1.75

11.5 PSO Attainment Level

Course	PSO1	PSO2	PSO3
CO Attainment	1.97	2.24	2.01
Direct Attainment	2.93	2.81	2.84
Indirect Attainment	2.16	2.35	2.17

12. Process for Redefining the PEOs of the Department



Process for Establishing the PEO's

The PEOs are established through the following process steps:

- Step1** Vision and Mission of the Institute & Department are taken into consideration to interact with various stake holders, and establish the PEO's of the Department.
- Step2** The Departmental Planning Committee which includes Head of the Department, Program Coordinator and Senior Faculty prepares the draft version of PEOs after getting instructions from Central Planning Committee.
- Step3** The draft version is discussed with stakeholders and their views are collected by the Departmental Planning Committee.
- Step4** The Central Planning Committee reviews and analyzes the PEOs and submits its Recommendations to the Departmental Planning Committee.

The Departmental Planning Committee deliberates on the recommendations and finalized the PEOs and submits them to the Central Planning Committee for final approval.

ANNEXURES

A. B.Tech Course List (2020-21)

Year	Course	Course Name	AKTU Course Code
FIRST YEAR	C101	Engineering Physics	KAS101T
	C102	Engineering Mathematics-I	KAS103T
	C103	Basic Electrical Engineering	KEE101T
	C104	Programming for Problem Solving	KCS101T
	C105	AI For Engineering	KMC101
	C106	Engineering Physics Lab	KAS151P
	C107	Basic Electrical Engineering Lab	KEE151P
	C108	Programming for Problem Solving	KCS151P
	C109	Engineering Graphics & Design Lab	KCE151P
	C110	Soft Skill I	KNC101
	C111	Engineering Chemistry	KAS202T
	C112	Engineering Mathematics-II	KAS203T
	C113	Emerging Domain in Electronics Engineering	KEC201T
	C114	Fundamentals of Mechanical Engineering & Mechatronics	KME201T
	C115	Emerging Technology for Engineering	KMC202
	C116	Engineering Chemistry Lab	KAS252P
	C117	Electronics Engineering Lab	KEC251P
	C118	English Language Lab	KAS254P
	C119	Mechanical Workshop Lab	KWS251P
	C120	Soft Skill II	KNC201
SECOND YEAR	C201	Electronics Engineering	KOE038
	C202	Technical Communication	KAS301
	C203	Data Structure	KCS301
	C204	Computer Organization and Architecture	KCS302
	C205	Discrete Structures & Theory of Logic	KCS303
	C206	Data Structures Using C Lab	KCS351
	C207	Computer Organization Lab	KCS352
	C208	Discrete Structure & Logic Lab	KCS353
	C209	Mini Project or Internship Assessment	KCS354
	C210	Computer System Security	KNC301
	C211	Maths IV	KAS402
	C212	Universal Human Values	KVE401
	C213	Operating Systems	KCS401
	C214	Theory of Automata and Formal Languages	KCS402
	C215	Microprocessor	KCS403

	C216	Operating Systems Lab	KCS451
	C217	Microprocessor Lab	KCS452
	C218	Python Language Programming Lab	KCS453
	C219	Python Programming	KNC402
THIRD YEAR	C301	Database Management System	KCS501
	C302	Compiler Design	KCS502
	C303	Design and Analysis of Algorithm	KCS503
	C304	Object Oriented System Design	KCS054
	C305	Application of Soft Computing	KCS056
	C306	Database Management System Lab	KCS551
	C307	Compiler Design Lab	KCS552
	C308	Design and Analysis of Algorithm Lab	KCS553
	C309	Mini Project or Internship Assessment	KCS554
	C310	Indian Tradition, Culture and Society	KNC502
	C311	Software Engineering	KCS601
	C312	Web Technology	KCS602
	C313	Computer Networks	KCS603
	C314	Big Data	KCS061
	C315	Image Processing	KCS062
	C316	Embedded System	KOE062
	C317	GIS & Remote Sensing	KOE066
	C318	Software Engineering Lab	KCS651
	C319	Web Technology Lab	KCS652
	C320	Computer Networks Lab	KCS653
C321	Constitution of India, Law and Engineering	KNC601	
FORTH YEAR	C401	Understanding the Human Being Comprehensively – Human Aspirations and its Fulfillment	ROE074
	C402	Application of Soft Computing	RCS071
	C403	Cloud Computing	RCS075
	C404	Distributed System	RCS701
	C405	Artificial Intelligence	RCS702
	C406	Distributed System Lab	RCS751
	C407	Artificial Intelligence Lab	RCS752
	C408	Industrial Training Viva Voce	RCS753
	C409	Project	RCS754
	C410	Digital and Social Media Marketing	ROE081
	C411	Renewable Energy Resources	ROE086
	C412	Machine Learning	RCS080
	C413	Image Processing	RCS082
	C414	Deep Learning	RCS086
	C415	Data Compression	RCS087

	C416	Seminar	RCS851
	C417	Project-II	RCS852

B. Passing Student Survey Form

United College of Engineering and Research
Department of Computer Science and Engineering
Passing Student Survey Form

Date: _____

Student Name: Anand Kumar Rai

University Roll no.: 1601010023

Batch: 2017-2021

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Attainment Level												

PSO	PSO1	PSO2	PSO3
Attainment Level			

Signature of Student

Enter attainment levels 1, 2 or 3 as defined below:

1: Slight (Low)

2: Moderate (Medium)

3: Substantial

(High)

If there is no attainment, put “-“

PO -1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO -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.
PO -3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

P.T.O.

C. Alumni Survey Form

United College of Engineering and Research
Department of Computer Science and Engineering
Alumni Survey Form

Date: _____

Student Name:

University Roll no.:

Batch:

-

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Attainment Level												

PSO			
Attainment Level			

Signature of Student

Enter attainment levels 1, 2 or 3 as defined below:

1: Slight (Low)

2: Moderate (Medium)

3: Substantial

(High)

If there is no attainment, put “-“

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

PO -3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO -4	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions for complex problems: <ul style="list-style-type: none"> • that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline as against problems given at the end of chapters in a typical text book that can be solved using simple engineering theories and techniques; • that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions; • that require consideration of appropriate constraints / requirements not explicitly given in the problem statement such as cost, power requirement, durability, product life, etc.; • which need to be defined (modelled) within appropriate mathematical framework; and • that often require use of modern computational concepts and tools, for example, in the design of an antenna or a DSP filter.
PO -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.
PO -6	The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO -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.
PO -8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO -9	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO -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.
PO -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.
PO -12	Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PSO-1	An Ability to apply their Skills in the field of Web Designing, Cloud Computing, Machine Learning, Artificial Intelligence, IOT and Data Analytics.
PSO-2	An Ability to Demonstrate Basic Knowledge of Database Systems, Software Engineering, Computer Hardware, Networking and Operating System.
PSO-3	An Ability to Design & Develop Programs, Algorithms and Projects using Efficient Data Structures.

