GHOUSIA INSTITUTE OF TECHNOLOGY FOR WOMEN

Near Dairy Circle, Hosur Road, Bengaluru-560029, KARNATAKA

Affiliated to VTU., Belagavi, Recognized by Government of Karnataka & A.I.C.T.E., New Delhi

The National Board of Accreditation (NBA), India was initially established by the AICTE (All India Council of Technical Education) under section 10(u) of AICTE Act, in the year 1994, in order to assess the qualitative competence of the programs offered by educational institution from diploma level to post-graduate level in engineering and technology, management, pharmacy, architecture and related disciplines, which are approved by AICTE.

Accreditation is a process of quality assurance and improvement, whereby a programme in an approved Institution is critically appraised to verify that the Institution or the programme continues to meet and/or exceed the Norms and Standards prescribed by regulator from time to time. It is a kind of recognition which indicates that a programme or Institution fulfills certain standards.

The purpose of the accreditation by NBA is to promote and recognize excellence in technical education in colleges and universities - at both the undergraduate and post graduate levels. Institutions, students, employers, and the public at large all benefit from the external verification of quality provided through the NBA accreditation process. They also benefit from the process of continuous quality improvement that is encouraged by the NBA's developmental approach to promote excellence in technical education. Accreditation is a tool that stakeholders use to monitor, assess and evaluate the standards and quality of the education a student receives at a college, university or other institution of higher learning.

Outcome based education is targeted at achieving desirable outcomes (in terms of knowledge, skills, attitudes and behaviour) at the end of a program. Teaching with this awareness and making the associated effort constitutes outcome based education. This entails a regular methodology for ascertaining the attainment of outcomes, and benchmarking these against the program outcomes consistent with the objectives of the program.

Expert Talk-01 : Dr. Anil Kumar Nassa, Member Secretary, NBA, New Delhi

Topic: NBA Accreditation- Introduction, Assessment Methodology, Guidelines, Benefits, Quality Initiatives, Washington Accord Membership & its Advantages, Renewal of WA Membership for the next 6 years effective from June, 2020, GAPC Version 4.0 and NBA Future Plan

Expert Talk-02 : Prof. S.S. Pattnaik, Vice Chancellor, Odisha State Open University, Sambalpur, Odisha

Topic: Methods of Assessment and Evaluation: Assessment Tools, Assessment of POs, PSOs, PEOs, & COs and thoughts on Closing the Loop for Continuous Improvement.

Expert Talk-03 : Prof. R.V. Ranganath, Dean (Academics), M.S. Ramaiah University of Applied Sciences, Bangalore

Topic: Self-Assessment Report (SAR) 2025: How to prepare the SAR and Effect Improvements during the Process (UG Engineering)

NBA

NATIONAL BOARD OF ACCREDITATION

Orientation Workshop on Outcome Based Education & Accreditation

20th January, 2025

Dr. Anil Kumar Nassa

Member Secretary

National Board of Accreditation

New Delhi-110003

NATIONAL BOARD OF ACCREDITATION

ABOUT NBA

- Established in the year 1994 under Section 10 (u) of AICTE Act.
- NBA became Autonomous in January 2010 and in April 2013 the Memorandum of Association and Rules of NBA were amended to make it completely independent of AICTE, administratively as well as financially.
- NBA now independent in its functioning: decision making as well as financially.
- Does not receive any grant either from the government or from any regulatory body of technical and higher education.

NATIONAL BOARD OF ACCREDITATION

NBA is committed to provide:

1. Credible System of Accreditation
2. Transparent & Accountable System

Credible System of Accreditation

- **Strength** and **credibility** of accreditation process largely lies in the integrity, honesty, expertise and professionalism.
- **Evaluators** – face of NBA.
- **Transparency**-
  - Report discussed in the meetings of EAC in presence of all team chair
  - Recommendations of EAC are considered in Sub-committee of AAC
  - Copy of the report is sent to the Institution
  - Change in decision communicated to the institution with reasons
  - 360 degree feedback

WHAT IS NOT THE PURPOSE OF ACCREDITATION

- **Not to** find faults with the institution but to assess the status-ante of the performance.
- **Not to** denigrate the working style of the institution and its programs but to provide a feed back on their strengths and weaknesses.
- **Not to** demarcate the boundaries of quality but to offer a sensitizing process for continuous improvement in quality provisions.
- **Not to** select only institutions of national excellence but to provide benchmarks of excellence and identification of good practices.

General Policy on Accreditation

The following general policies are the guiding principles for the accreditation of programs:

1. Programs, and not Educational Institutions, are considered for accreditation.

2. Programs from which at least two batches of students have graduated are considered for accreditation.

Outcome-Based Program Accreditation

- Knowledge and competencies profiles
- Graduate Attributes(GAs)/Program Outcomes(POs) which form the student learning outcomes:
  - PO1: Engineering Knowledge
  - PO2: Problem Analysis
  - PO3: Design/Development of Solutions
  - PO4: Conduct Investigations of Complex Problems
  - PO5: Engineering Tool Usage
  - PO6: The Engineer and The World
  - PO7: Ethics
  - PO8: Individual and Collaborative Team work
  - PO9: Communication
  - PO10: Project Management and Finance
  - PO11: Life-Long Learning:

NBA Outcome Based Accreditation

Two Tier System

❖ Introduction of **Two-Tier System** based on Types of Institutions.

- **The Tier–I documents**: Applicable to the engineering/technology programs offered by academically **autonomous institutions** and by university departments and constituent colleges of the Universities.

- **Tier-II documents**: Applicable to **non-autonomous** Institutions, i.e., those Colleges and technical Institutions which are affiliated to a University.

- **For both** (Tier-I & Tier-II): Same set of criteria have been prescribed for accreditation.

Marks Comparison of SAR of UG Engineering Tier-I & Tier II - (GAPC V4.0)

S.No.	Criteria	UG Engineering	
		Tier-I	Tier-II
1.	Outcome-Based Curriculum	120	120
2.	Outcome-Based Teaching Learning	120	120
3.	Outcome-Based Assessment	120	120
4.	Students' Performance	120	120
5.	Faculty Information	100	100
6.	Faculty Contributions	120	120
7.	Facilities and Technical Support	100	100
8.	Continuous Improvement	80	80
9.	Student Support and Governance	120	120
TOTAL		1000	1000

Program Outcomes (POs)

1. **Engineering knowledge**: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
2. **Problem Analysis**: Identify, formulate, review research literature and analyse complex engineering problems reaching substantiated conclusions with consideration for **Sustainable Development** (WK1 to WK4).
3. **Design/Development of Solutions**: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required (WK5).
4. **Conduct investigations of Complex Problems**: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions (WK8).
5. **Engineering Tool usage**: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6).

gram Outcomes (POs)-Proposed

6. **The Engineer and The World**: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on **Sustainability** with reference to economy, health, safety, legal framework, culture and environment (WK1, WK5, and WK7).
7. **Ethics**: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws (WK9).
8. **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
9. **Communication**: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
10. **Project Management and Finance**: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
11. **Life-Long Learning**: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change (WK8).

Pre-Qualifiers: TIER-I UG (Engg.,) Program

S.N.	Pre Visit Qualifiers	Current Status	Compliance Status Complied/Not Complied
	Essential qualifiers		
1	Whether approval of the competent authority (Approval of AICTE/UGC/BoG of Universities/ Deemed Universities etc.) for the program under consideration has been obtained for all the years including current academic year		
2	Whether the Student Faculty Ratio (SFR) in the Department and allied Departments is less than or equal to 25:1, averaged over three academic years: CAY, CAYm1, and CAYm2	SFR	
3	Whether the number of faculty having Ph.D degree available in the Department & allied Departments is greater than or equal to 20% of the required number of faculty averaged over two academic years i.e. CAY and CAYm1.		
4	Whether two batches have passed out in the program under consideration		
5	Whether HoD possesses Ph.D. degree		

Pre-Qualifiers: TIER-I UG (Engg.,) Program

S.N.	Pre Visit Qualifiers	Current Status	Compliance Status Complied/Not Complied
Essential qualifiers			
6	**Case 1:** If the Department/School is not running multiple UG (Engineering) programs and does not have allied departments, which are running undergraduate engineering programs, then the program under consideration needs either 2 Professors or 1 Professor and 1 Associate Professor on a regular basis with Ph.D. degree in the current academic year (CAY) and the previous academic year (CAYm1). **Case 2:** If the Department/School, including allied departments, is running multiple UG (Engineering) programs, the program under consideration needs either 2 Professors or 1 Professor and 1 Associate Professor on a regular basis with Ph.D. degree in CAY and CAYm1. Additionally, the remaining UG (Engineering) programs (N*) need N Professors or N Associate Professors in the Department/ School/ Allied departments on a regular basis with Ph.D. degree in CAY and CAYm1 in total.		

Tier – I Grades

% of Marks	Grade
❖ ≈75% & Above	'Y'
❖ ≈ 60% and <75%	'C'
❖ ≈ 40% and <60%	'W'
❖ <40%	'D'

Award of Accreditation UG (Engg.,): Tier-I

Accreditation for Six Years:

1. There should not be any Deficiency (D) or Weakness (W) in any of the criteria and at least six criteria must be fully compliant (Y), with only 'Concerns (C)' in the remaining criteria (Y >=6, W & D=0).

2. The no. of faculty having Ph. D degree available in the Department & allied Departments is greater than or equal to 20% of the required no. of faculty averaged over two academic years i.e. CAY and CAYm1.

3. Student Faculty Ratio (SFR) in the Department and allied Departments should be less than or equal to 20:1, averaged over 3 academic years i.e. CAY, CAYm1 and CAYm2.

4. HoD should be on regular basis and possess Ph.D. degree for the programs under consideration in the CAY.

Award of Accreditation UG (Engg.,): Tier-I Accreditation for Six Years:

5. <u>Required no. of Professors or Associate Professors</u>

- **Case 1**: If the Department/School is not running multiple UG (Eng.,) programs and does not have allied departments, which are running UG (Engg.,) programs, then the program under consideration needs either 2 Professors or 1 Professor and 1 Associate Professor on a regular basis with Ph.D. degree in CAY and CAYm1.

- **Case 2**: If the Department/School, including allied departments, is running multiple UG (Engg.,) programs, the program under consideration needs either 2 Professors or 1 Professor and 1 Associate Professor on a regular basis with Ph.D. degree in CAY and CAYm1. Additionally, the remaining UG (Engg.,) programs (N*) need N Professors or N Associate Professors in Department/ School/ Allied departments on a regular basis with Ph.D. degree in CAY and CAYm1 in total.

Note*: Exclude the no. of Professors/Associate Professors for the UG (Engg.,) programs that have been running for less than 3 years (CAY, CAYm1)

Award of Accreditation for UG (Engg.,): Tier-I

Accreditation for Three Years:

1. There should not be any Deficiency (D) and at least three criteria must be fully compliant (Y).
2. The no. of faculty having Ph. D degree available in the Department & allied Departments is greater than or equal to 20% of the required no. of faculty averaged over two academic years i.e. CAY and CAYm1.
3. Student Faculty Ratio (SFR) in the Department and allied Departments should be less than or equal to 25:1, averaged over 3 academic years i.e. CAY, CAYm1 and CAYm2.
4. HoD should possess Ph.D. degree for the programs under consideration in the CAY.

Award of Accreditation for UG (Engg.): Tier-I

Accreditation for Three Years

5. Required no. of Professors or Associate Professors

- **Case 1**: If the Department/School is not running multiple UG (Eng.,) programs and does not have allied departments, which are running UG (Engg.,) programs, then the program under consideration needs either 2 Professors or 1 Professor and 1 Associate Professor on a regular basis with Ph.D. degree in CAY and CAYm1.

Award of Accreditation for UG (Engg,): Tier-I

No Accreditation of the Program

- **Case 2**: If the Department/School, including allied departments, is running multiple UG (Engg.,) programs, the program under consideration needs either 2 Professors or 1 Professor and 1 Associate Professor on a regular basis with Ph.D. degree in CAY and CAYm1. Additionally, the remaining UG (Engg.,) programs (N*) need N Professors or N Associate Professors in Department/ School/ Allied departments on a regular basis with Ph.D. degree in CAY and CAYm1 in total.

Note*: Exclude the no. of Professors/Associate Professors for the UG (Engg.,) programs that have been running for less than 3 years (CAY, CAYm1)

- If the program fails to meet criteria for award of accreditation for 3 years, the program will not be considered for accreditation.

Pre-Qualifiers: TIER-II UG (Engg.,) Program

S.N.	Pre-Visit Qualifiers	Current Status	Compliance Status(Complied /Not Complied
1	Whether the approval of AICTE for the programs under consideration has been obtained for the previous five years, starting from the current academic year		
2	Whether the Student Faculty Ratio (SFR) in the Department and allied Departments is less than or equal to 25:1, averaged over three academic years: Current Academic Year (CAY), Current Academic Year Minus One (CAYm1), and Current Academic Year Minus Two (CAYm2)		

Pre-Qualifiers: TIER-II UG (Engg.,) Program

S.N.	Pre-Visit Qualifiers	Current Status	Compliance Status(Complied/ Not Complied)
3	**Case 1:** If the Department/School is not running multiple UG (Engineering) programs and does not have allied departments, which are running undergraduate engineering programs, then the Department/School under consideration needs either 1 Professor or 1 Associate Professor on a regular basis with Ph.D. degree in the current academic year (CAY) and the previous academic year (CAYm1).		

Pre-Qualifiers: TIER-II UG (Engg.,) Program

S.N.	Pre-Visit Qualifiers	Current Status	Compliance Status(Complied /Not Complied)
3	**Case 2:** If the Department/School, including allied departments, is running multiple UG (Engineering) programs, the Department/ School under consideration needs either 1 Professor or 1 Associate Professor on a regular basis with Ph.D. degree in CAY and CAYm1. Additionally, the remaining UG (Engineering) programs (N*) need N Professors or N Associate Professors in the Department/ School/ Allied Departments on a regular basis with Ph.D degree in CAY and CAYm1 in total.		

Note*: Exclude the number of Professors/Associate Professors for the UG programs (Engineering) that have been running for less than 3 years (CAY, CAYm1).

Pre-Qualifiers: TIER-II UG (Engg.,) Program

S.N.	Pre-Visit Qualifiers	Current Status	Compliance Status(Complied/ Not Complied)
4	Whether the number of faculty having Ph.D degree available in the Department & allied Departments is greater than or equal to 10% of the required number of faculty averaged over two academic years i.e. Current Academic Year (CAY) and Current Academic Year Minus One (CAYm1)		
5	Whether two batches have passed out in the program under consideration		

Proposed Award of Accreditation: TIER-II UG (Engg.,):

Accreditation for Six Years:

1. Program should score a minimum of 750 points in aggregate out of 1000 points with minimum score of 60% in mandatory fields (i.e. criteria 3 to 6)

2. The number of faculty having Ph.D degree available in the Department & allied Departments is greater than or equal to 20% of the required number of faculty averaged over two academic years i.e. Current Academic Year (CAY) and Current Academic Year Minus One (CAYm1).

Proposed Award of Accreditation: TIER-II UG (Engg.,)

Accreditation for Six Years:

3. The Student Faculty Ratio (SFR) in the Department and allied Departments should be less than or equal to 20:1 averaged over 3 academic years i.e. Current Academic Year (CAY), Current Academic Year Minus One(CAYm1), Current Academic Year MinusTwo (CAYm2).

4. The HOD of the department in which the program under consideration is running should be appointed on regular basis and should possess PhD degree in the Current Academic Year (CAY).

Proposed Award of Accreditation: TIER-II UG (Engg.,):

Accreditation for Six Years:

5. **Case 1**:

   If the Department/School is not running multiple UG (Engineering) programs and does not have allied departments, which are running undergraduate engineering programs, then the program under consideration needs either 2 Professors or 1 Professor and 1 Associate Professor on a regular basis with Ph.D. degree in the current academic year (CAY) and the previous academic year (CAYm1).

Proposed Award of Accreditation: TIER-II UG (Engg.,):

Accreditation for Six Years:

5. **Case 2**:

   If the Department/School, including allied departments, is running multiple UG (Engineering) programs, the program under consideration needs either 2 Professors or 1 Professor and 1 Associate Professor on a regular basis with Ph.D. degree in CAY and CAYm1. Additionally, the remaining UG (Engineering) programs (N*) need N Professors or N Associate Professors in the Department/ School/ Allied departments on a regular basis with Ph.D. degree in CAY and CAYm1 in total.

Note*: Exclude the number of Professors/Associate Professors for the UG programs (Engineering) that have been running for less than 3 years (CAY, CAYm1).

Proposed Award of Accreditation: TIER-II UG (Engg.,):

Accreditation for Three Years:

1. Program should score a minimum of 600 points in aggregate out of 1000 points with minimum score of 40% in mandatory fields (i.e. criteria 4 to 5)

2. The number of faculty having Ph. D degree available in the Department & allied Departments is greater than or equal to 10% of the required number of faculty averaged over two academic years i.e. Current Academic Year (CAY) and Current Academic Year Minus One (CAYm1).

Proposed Award of Accreditation: TIER-II UG (Engg.,):

Accreditation for Three Years:

3. The Student Faculty Ratio(SFR) in the Department and allied Departments should be less than or equal to 25:1 averaged over 3 academic years i.e. Current Academic Year(CAY),Current Academic Year Minus One (CAYm1), Current Academic Year Minus Two (CAYm2).

4. **Case 1**:

If the Department/School is not running multiple UG (Engg.,) programs and does not have allied departments, which are running undergraduate engineering programs, then the program under consideration needs either 1 Professor or 1 Associate Professor on a regular basis with Ph.D. degree in the current academic year(CAY) and the previous academic year (CAYm1).

Proposed Award of Accreditation: TIER-II UG (Engg.,):

Accreditation for Three Years:

4. **Case 2**:

If the Department/School, including allied departments, is running multiple UG (Engineering) programs, the program under consideration needs either 1 Professor or 1 Associate Professor on a regular basis with Ph.D. degree in CAY and CAYm1. Additionally, the remaining UG (Engineering) programs (N*) need "N" Professors or "N" Associate Professors in the Department/ School/ Allied departments on a regular basis with Ph.D. degree in CAY and CAYm1 in total

Note*: Exclude the number of Professors/Associate Professors for the UG programs (Engineering) that have been running for less than 3 years (CAY, CAYm1).

Guidelines for Faculty and SAR:

- The faculty will be counted in the respective year, if the faculty has joined before or on 31st August of the same year and continued till 30th April of the subsequent year.
- There is no age limit to the consideration for the emeritus faculty as long as they are physically fit to take classes and engage with students, and are employed on a full time basis.
- The available and required no. of PhD. in the Department shall be truncated to its nearest lower integer.
- In the disciplines like MBA or PGDM or specialized areas like Biotechnology, all the qualifications relevant and purposeful to those disciplines need to be considered, in addition to the M.Tech/MBA/ PGDM degrees.
- All the faculty whether regular or contractual (except part-time or hourly based), will be considered.
- All regular faculty members shall meet the AICTE qualifications and experience requirements.

Guidelines for Faculty and SAR:

- Contractual faculty appointed with any terminology whatsoever, who have taught for 2 consecutive semesters with or without break between the 2 semesters in corresponding academic year on full-time basis shall be considered for the purpose of calculation in the faculty student ratio.
- Following will be ensured in case of contractual faculty:
  - Shall have the AICTE prescribed qualifications and experience.
  - Shall be appointed on full time basis and worked for consecutive two semesters with or without break between the 2 semesters during the particular academic year under consideration.
  - Should have gone through an appropriate process of selection and the records of the same shall be made available to the visiting team during NBA visit.

Guidelines for Faculty and SAR

- Academic year is considered from July to June
- If the SAR is submitted before 30th September, then the CAY shall be the previous academic year and if the SAR is submitted after 30th September, then the CAY shall be the running academic year for the purpose of data consideration and calculations.
  - **CAY**: Current Academic Year
  - **CAYm1**: Current Academic Year Minus 1
  - **CAYm2**: Current Academic Year Minus 2
  - **CAYm3**: Current Assessment Year Minus 3

Student Faculty Ratio (SFR) Considered by NBA

UG Engineering Programs (Tier I & Tier II):

- ❖ 25:1 for the Accreditation of 3 years
- ❖ 20:1 for the Accreditation of 6 years

PG Engineering and MCA Programs**:**

- ❖ 25:1 for the Accreditation of 3 years
- ❖ 20:1 for the Accreditation of 6 years

Diploma Engineering Programs:

- ❖ 30:1 for the Accreditation of 3 years & 6 years

PG Management Programs:

- ❖ 25:1 for the Accreditation of 3 years
- ❖ 15:1 for the Accreditation of 6 years.

UG & PG Pharmacy Programs:

- ❖ 20:1 for the Accreditation of 3 years
- ❖ 15:1 for the Accreditation of 6 years

Diploma Pharmacy Programs:

- ❖ 25:1 for the Accreditation of 3 years & 6 years

Thank you

NBA Awareness Workshop

NITTTR, Bhopal

20 January, 2025

Prof.Shyam Sundar Pattnaik
Vice Chancellor, OSOU (Govt. of Odisha)

Former Director
NITTTR (MOE, Govt. of India), Chandigarh
And
Former Vice Chancellor
BPUT (A Technical University of Govt. of Odisha)

What is Expected from Engineering Activity

INTERNATIONAL ENGINEERING ALLIANCE

Engineering is an activity that is essential to meeting the needs of people, economic development and the provision of services to society. Engineering involves the purposeful application of mathematical and natural sciences and a body of engineering knowledge, technology and techniques. Engineering seeks to produce solutions of which the effects are predicted to the greatest degree possible, in often uncertain contexts. While bringing benefits, engineering activity has potential adverse consequences. Engineering therefore must be carried out responsibly and ethically, use available resources efficiently, be economic, safeguard health and safety, be environmentally sound and sustainable and generally manage risks throughout the entire life cycle of a system. The United Nations Sustainable Development Goals present targets for 2030. Engineers are vital contributors for making progress towards these goals.Typical engineering activity requires several roles including those of the engineer, engineering technologist and engineering technician, recognized as professional registration categories in many jurisdictions. These roles are defined by their distinctive competences

Applying Engineering
Knowledge: WK1
Cognitive: Bloom's Taxonomy

Tool Usage
Individual and
Collaborative Work
Communication
Project Management
and Finance
WK2, WK6

Psychomotor:
Dave's Taxonomy

KNOWLEDGE

SKILL

Programme Outcomes
POs

11 POs in New SAR

LIFE ACTIVITIES

Problem Solving

BLOOM'S HIGHER level

Problem Analysis

Design and
Development

Investigation

WK2, WK3,
WK4,WK8

Affective: Bloom's Taxonomy

Attitude, Engineer and the World, Ethics, Values, Culture and Life-long learning WK5,WK7, WK9,

POs and WKs

- PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences. WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline. WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline. WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

POs and WKs

- PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
- PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues

- PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
- PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences. WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline. WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline. WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline. WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area. WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline. WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

POs and WKs

- PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
- PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- PO9: Communication: Communicate effectively and inclusively within the engineering
- PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
- PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues. WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

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

Breadth, depth and type of knowledge, both theoretical and practical

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

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

Complexity of analysis

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

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

Breadth and uniqueness of engineering problems i.e. the extent to which problems are original and to which solutions have not previously been identified or codified

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re- use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

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

Breadth and depth of investigation and experimentation

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues

Programme Outcomes

- **What are the knowledge+Skill+Life Activities and Attitude a graduate is going to inculcate during undergoing the programme and going to practice in the professional career**
- **Generic in nature**
- **Every component is measurable or quantifiable hence, outcomes**
- **In simple language these are the GUNNAs, a graduate is supposed to develop while going through the programme**

What and How of OBE

OBE is a measurable quality improvement framework/system

- What do we want our students to achieve or imbibe?

  Captured in PROGRAM OUTCOMES [POs]. Achievement is judged by assessment and evaluation of attainment of POs

- How do our students achieve it?

  Launched curriculum imparted through Teaching-Learning and assessment and evaluation.

  Qualitative and quatitative rating is done by asseessment and evaluation of Course Outcomes [COs]

- What action is taken to address specialisation of a Programme?

  Defining Programme Specific Outcomes (PSOs)

- How do we close the loop for further improvement (Continuous Quality Improvement (CQI)?

  Make use of the assessment of attainment of COs and POs

OLD Evaluation Criteria NEW

Criteria No.	Criteria	Marks
Program Level Criteria		
1.	Vision, Mission and Program Educational Objectives	50
2.	Program Curriculum and Teaching – Learning Processes	100
3.	Course Outcomes and Program Outcomes	175
4.	Students' Performance	100
5.	Faculty Information and Contributions	200
6.	Facilities and Technical Support	80
7.	Continuous Improvement	75
Institute Level Criteria		
8.	First Year Academics	50
9.	Student Support Systems	50
10.	Governance, Institutional Support and Financial Resources	120

Criterion No.	Criterion Titles	Marks
1	Outcome based Curriculum	120
2	Outcome based Teaching-Learning	120
3	Outcome based Assessment	120
4	Students' Performance	120
5	Faculty Information	100
6	Faculty Contributions	120
7	Facilities and Technical Support	100
8	Continuous Improvement	80
9	Students support and Governance	120

- Points for Attention in NEW SAR

Criterion 1:Outcome based Curriculum: 120

1.1.5. Mapping of PEOs with Mission (10)

(Generate a Mission of the Department–PEOs matrix with justification and rationale of the mapping.)

Table No.1.1.5.1: Mapping of PEOs with mission.

PEO Statements	**M_1**	**M_2**	**....**	**M_n**
PEO1:				
PEO2:				
PEON:				

Note:

- M_1, M_2. . . M_n are distinct elements of mission statement. Enter correlation levels as Low (1), Medium (2) and High (3). If there is no correlation, put "-"

Criterion 1:Outcome based Curriculum: 120

1.2.4. Strategies for Education Reforms (05)

(A brief explanation of the plans to implement and map activities in curriculum design with multidisciplinary and interdisciplinary programs, the establishment of an academic bank of credits system, APAAR etc.)

1.3. PO, PSO and their Mapping with Courses (20)

1.3.1. POs and PSOs (05)

(Program Specific Outcomes (PSOs) are defined by the program, with up to 3 PSOs specified.)

List of POs as Defined by NBA in Annexure II.

List of PSOs (up to 3)

(Provide details of the PSOs for the program currently seeking accreditation.)

Criterion 1:Outcome based Curriculum: 120

1.3.2. Mapping between the Courses and POs/PSOs (15)

(Mention the courses relevant to the POs/PSOs.)

Table No.1.3.1: Connection of courses with POs/PSOs.

PO Number	List of Courses
PO1:	
PO2:	
PON:	

Add more rows for PSOs

Criterion 1:Outcome based Curriculum: 120

1.4.1. Course Outcome (Semester Wise) (15)

(Provide Course outcomes (COs) for two core courses per semester from 1-8 semesters as a sample. The maximum number of outcomes for a course is expected to be around 6. COs should reflect on the measurable outcomes towards attaining POs and PSOs).

Table No. 1.4.1.1: Course outcomes.

Semester No:			
Course Title:		**Course Code:**	
Course Outcome No.	**Course Outcome Statement**		

Criterion 2: Outcome based Teaching-Learning: 120

2.5. **[illegible] (10)**

(Type and complexity, POs/PSOs addressed.)

2.6. **SWAYAM/NPTEL/MOOC/Self Learning (10)**

(Number of students registered, certification and POs/PSOs addressed.)

2.7. **Solving [illegible] Problems Incorporating [illegible] (20)**

(Provide details of core courses (Project based learning, problem-based learning), mini projects, integrated design projects, capstone projects, hackathon or any other activity-based learning towards [illegible] [illegible] [illegible].)

2.8. **Steps Taken for Enhancing Industry Institute Partnerships (15)**

(Provide details of partial delivery of courses, industry supported labs, industry offered short-term programs/training etc.)

Criterion 3: Outcome based Assessment: 120

3.3. Evaluation of Laboratory Work and Workshop (Continuous and SEE) (10)

(Provide details of rubrics used to assess learnings in laboratories and workshops linking with COs and POs/PSOs targeted. Evidence of student a[illegible] [illegible] to be kept in course files for evaluation.)

3.4. Evaluation of Industrial Training/ Internship (Continuous and SEE) (10)

(Provide details of rubrics used to assess learnings in internships/industrial trainings linking POs/PSOs targeted for attainment. Evidence of student a[illegible] [illegible] to be kept in course files for evaluation.)

3.5. Evaluation of Projects (20)

(Provide details of rubrics used to assess learnings in projects linking POs/PSOs targeted for attainment. Evidence of student a[illegible] to be kept in course files for evaluation.)

3.6. Evidence of Addressing S[illegible] (SDG) (10)

(Provide details of student work carried out to meet sustainable development goals such as research work, [illegible], student activities etc. Evidence in the form of a portfolio to be made available during the visit.)

Criterion 3: Outcome based Assessment:120

Table No. 3.8.2: PO and PSO attainment value using indirect assessment tools.

Name of the Survey	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
Survey 1											
Survey 2											
Survey 3											
.....											
Indirect Attainment											

Add more columns as needed for PSOs if any.

Note:

- Mention the type of survey conducted and the location of its [illegible].
- Indirect attainment level of a PO/PSO is determined based on the student exit surveys, employer surveys, etc.

Criterion 4:Students' Performance: 120

Example for Table **No.4B:** A[illegible]rough multiple [illegible]

Item (No. of students admitted/exited through multiple entry and exit points) in the respective batch		**CAY 2023-24**	**CAYm1 2022-23**	**CAYm2 2021-22**	**CAYm3 2020-21**	**CAYm4 (LYG) 2019-20**	**CAYm5 (LYGm1) 2018-19**	**CAYm6 (LYGm2) 2017-18**
N5(Multiple entry) N5=N52+N53+N54	N52= No. of students admitted in 2nd year via multiple entry and exit points in same batch	0(NA)	2	1	2	1	1	2 (a)
	N53= No. of students admitted in 3rd year via multiple entry and exit points in same batch	0(NA)	0(NA)	0	0	0	0	1 (b)
	N54= No. of students admitted in 4th year via multiple entry and exit points in same batch	0(NA)	0(NA)	0(NA)	0	0	0	1 (c)
	N5=N52+N53+N54	0(NA)	2	1	2	1	1	4
N6 (Multiple exit) N6=N61+N62+N63	N61= No. of students exits after 1st year via multiple entry and exit points in same batch	0(NA)	1	1	1	0	1	1 (d)
	N62= No. of students exit after 2nd year via multiple entry and exit points	0(NA)	0(NA)	0	0	0	0	1(e)
	N63= No. of students exit after 3rd year via multiple entry and exit points in same batch	0(NA)	0(NA)	0(NA)	0	0	0	0 (f)
	N6=N61+N62+N63	0(NA)	1	1	1	0	1	2

Criterion 5:Faculty Information: 100

Criterion 5: Faculty Information (100)

Table No. 5A: Faculty details

S.N.	Name of the Faculty	PAN No.	[illegible] ID*(if any)	Highest degree	University	Area of Specialization	Date of Joining in this Institution	Experience in years in current institute	Designation at Time Joining in this Institution	Present Designation	The date on which Designated as Professor/ Associate Professor if any	Nature of Association (Regular/ Contract/ Ad hoc)	If contractual mention Full time or (Part time or hourly based)	Currently Associated (Y/N)	Date of Leaving if any (In case Currently Associated is " No")
1															
..															

Criterion 8: Continuous Improvement: 80

8.2. Academic Audit and Actions Taken thereof during the Period of Assessment (15)

(Academic audit system/process and its implementation in relation to continuous improvement.)

Criterion 9: Students support and Governance: 120

9.3. Feedback Analysis (10)

9.3.1. Feedback on Teaching and Learning Process and Corrective Measures Taken, if any (05)

(Provide details of the feedback collection process on TLP, average percentage of students who participate; Specify the feedback analysis process; Basis of reward/ corrective measures during the assessment period. Specify the number of corrective measures taken. Exhibit the details of analysis done.)

9.3.2. Feedback on Academic Facilities (05)

(Provide details of the feedback collection process on facilities, its analysis and corrective actions taken during the assessment period.)

Criterion 9: Students support and Governance: 120

9.6. Governance and Transparency (25)

9.6.1. Availability of the Institutional Strategic Plan and its Effective Implementation and Monitoring (10)

(Provide details of the Institute's strategic plan or Institutional Development Plan (IDP), its approval by the competent authority, and its implementation.)

Criterion 9: Students support and Governance:120

9.11. [illegible] and Implementation of Sustainable Development Goals ([illegible]) (10)

(Provide details of initiatives taken towards implementation of SDG specifically on green energy, waste management, preserving water, net zero, quality education, reuse, recycle, less use to renewables, etc. Provide evidences on implementation (projects assigned, R & D activities, entrepreneurial activities, outreach programs etc.)

9.12. Innovative Educational Initiatives and Implementation (05)

(Provide details of initiatives taken towards mobility of students, implementation of academic bank of credits, and s[illegible] including human values, multidisciplinary/interdisciplinary curriculum/programs, initiatives on [illegible], Contribution towards and implementation of teaching in Indian language, etc. Policies on inclusivity and equity and their implementation, [illegible] Action plan and its implementation for slow learners.)

Criterion 9: Students support and Governance:120

9.13. Faculty Performance Appraisal and Development System (FPADS) (10)

(Faculty members of Higher Educational Institutions today have to perform a variety of tasks pertaining to diverse roles. In addition to instruction, faculty members need to innovate and conduct research for their self-renewal, keep abreast of changes in technology, and develop expertise for the effective implementation of curricula. They are also expected to provide services to the industry and community to understand and contribute to solving real-life problems in industry. Another role involves shouldering administrative responsibilities and cooperating with other faculty, heads of departments, and the head of the institute. An [illegible] for faculty is vital for optimizing the contribution of individual faculty to institutional performance.

The assessment is based on a well-defined system for faculty appraisal for all the assessment years and its implementation and effectiveness.)

9.14. Outreach Activities (05)

(Provide details of outreach activities such as community service, Unnat Bharat Abhiyan, [illegible] undertaken by the students and their achievements.)

Quality Link/Mapping

High POs Attainment------Quality

- Extent of COs contributions to POs: COs and PO→CO mapping
- Contribution of curriculum to COs: Curriculum mapping to COs
- Curriculum Strength for quality support: Curriculum to Taxonomy
- Effective implementation of curriculum: T-L-A → constructive alignment
- Assessment and Evaluation standard: Question mapping to COs
- Feedback and improvement mapping
- Quality and relevance of feedback questions to criteria and Audit

OBE Dominant Criteria

Criterion 1	Outcome based Curriculum
Criterion 2	Outcome based Teaching Learning
Criterion 3	Outcome based Assessment
Criterion 6	Faculty Contributions
Criterion 8	Continuous Improvement

POs (Outcome)	PSOs (Outcome)	PEOs (Objective)
• As per New SAR: 11 • Defined by NBA • The Graduates to attain after duration of 4 years • Attainment before getting the degree • Attributes or Gunn a students to imbibe/inculcate during the programme • Defined for Programme i.e. UG/PG/MBA/MCA etc., • Assessed using teaching-learning and assessment records	• 2 to 3 to be defined for each programme • Fill up the gaps to contribute towards POs • Attainment before getting the Degree • Support specialization or beyond syllabus • Defined for a particular programme of a discipline such as UG: Civil or PG: Electrical etc., • Assessed using teaching-learning and assessment records	• 4 to 5 to be listed for each programme • Expected to achieve after 3 to 4 years or beyond after degree • It is like the dream the stakeholders establishing the institute see • POs and PSOs are feeder to PEOs • Assessed using Alumni data and interacting with employers

PEOs

PEO1:

Globally acclaimed Telecommunication entrepreneur for space industries

PEO2:

Renowned Educationist with extraordinary professional accomplishments

PEO3:

Keen Investigator and Contributor to Indian Knowledge System through recognized Research Work

PEO4:

Technical leaders to spearhead the advancement of telecommunications in the country

Key Interrelationship

Vision

Mission

Mapping Matrix with Mission: PEOs and Mission Articulation Matrix

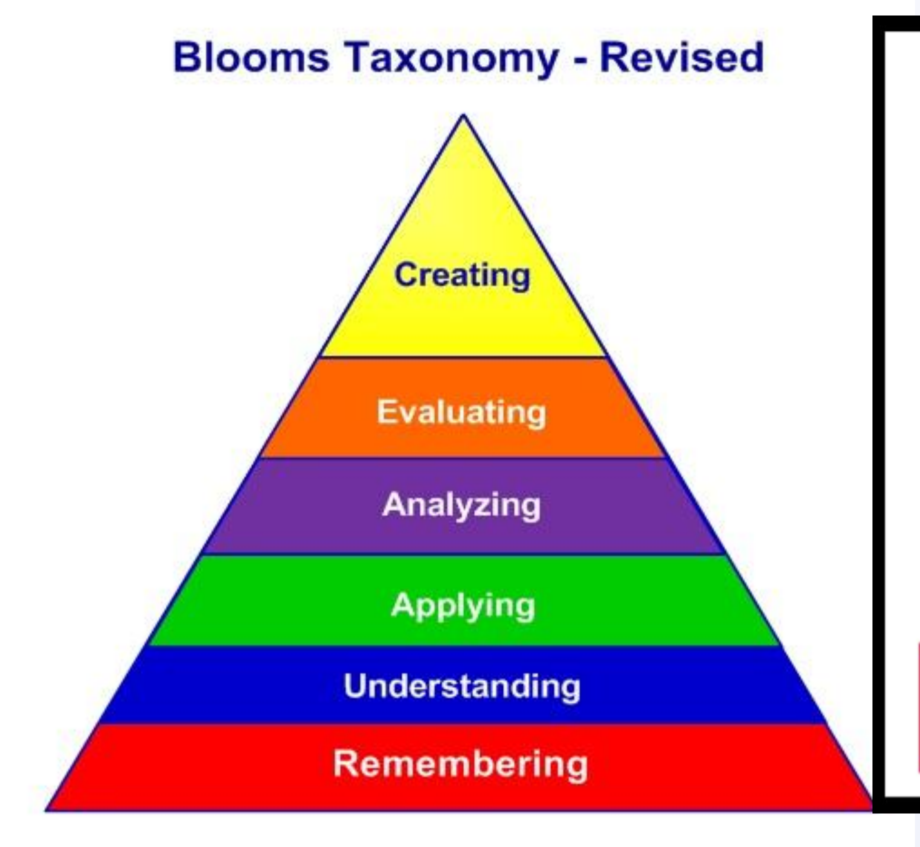
Bloom Verbs

Lower Order —————————————— *Higher Order*

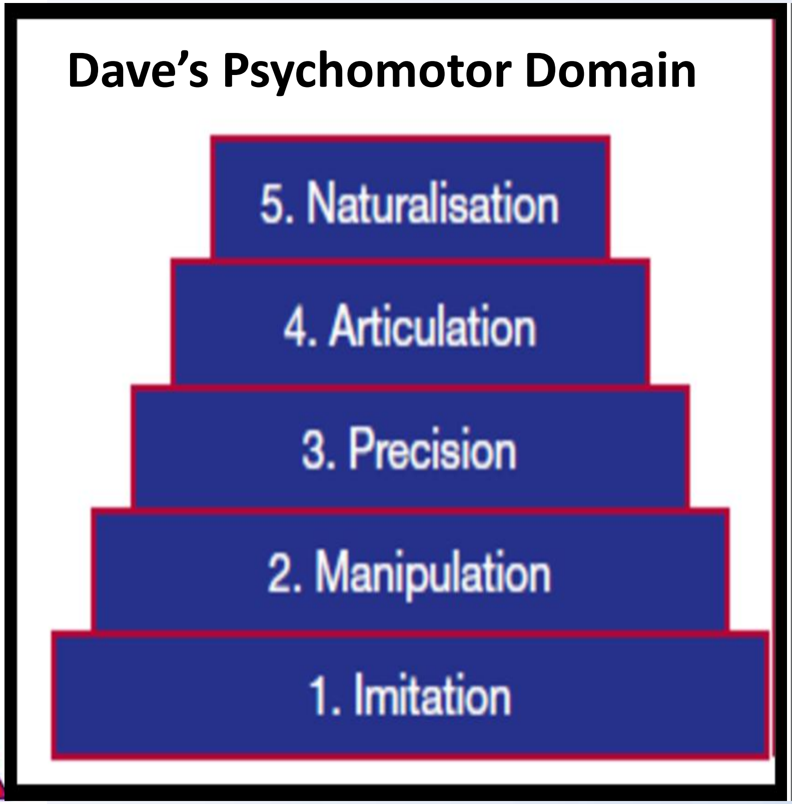
recall	examine	apply	analyze	evaluate	create
describe	explain	complete	compare & contrast	justify	plan
name	compare	use	examine	assess	invent
find	discuss	examine	explain	prioritize	compose
list	predict	illustrate	identify	recommend	design
relate	outline	classify	categorize	rate	construct
write	restate	solve	investigate	inspect	synthesize

Retrieved from http://maasd.edublogs.org/2012/26/linking-ipads-blooms-taxonomy/

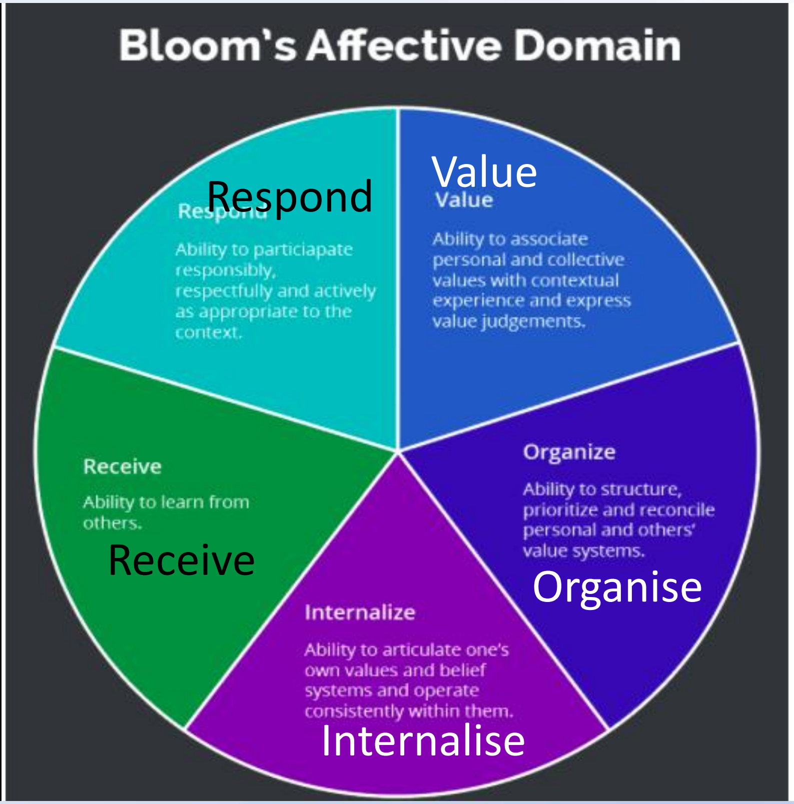
Taxonomy



Blooms Taxonomy - Revised
Creating
Evaluating
Analyzing
Applying
Understanding
Remembering



Dave's Psychomotor Domain
5. Naturalisation
4. Articulation
3. Precision
2. Manipulation
1. Imitation



Bloom's Affective Domain
Respond
Ability to particiapate responsibly, respectfully and actively as appropriate to the context.
Value
Value
Ability to associate personal and collective values with contextual experience and express value judgements.
Receive
Ability to learn from others.
Receive
Organize
Ability to structure, prioritize and reconcile personal and others' value systems.
Organise
Internalize
Ability to articulate one's own values and belief systems and operate consistently within them.
Internalise

Assessment Tools

- Mid-Sem and End-Sem Exam
- Tutorials
- Home Assignment
- Laboratory Test
- Project Work
- Viva, Quiz, Seminar

DIRECT **INDIRECT**

- Employer's Feedback
- Alumni Feedback Exit survey
- Result of GATE/CAT/GRE/Any national level test
- Publications/ Patent/ Awards/ Rubrics
- Professional Society membership and position

Assessment of attainment of Outcomes – COs and POs

- OUTCOMES are what our students achieve by T-L-A
- The attainment helps identify doable improvements and act on these.
- CO attainment are to be calculated by the teacher at the end of the course
- Since POs are achieved by COs, PO assessment will use CO assessment as input and be based on CO-PO matrix which captures the contribution of COs to POs
- CO assessment will be based on how students do in the tests/quizzes, internal/end-semester examinations, assignments/home-work and therefore, we need to capture connection between questions in the exam/test and the COs
- These assessments are for an entire class (i.e., aggregate) – as distinct from individual student performance

CO-PO mapping (connecting COs with POs)

The mapping is a matrix with rows as COs and columns as POs

Each cell in the matrix has a value in {--, 1, 2, 3}

The meaning associated with the values are as follows:

-- this CO (row) has contributions to the PO(column)

1 → relevant and small significance

2 → medium or moderate and

3 → strong

These values have to be justified in implementation, that is, T-L-A of the course, in terms of the BLOOM Level of the questions/Problems

CO-PO mapping

COs\POs	PO1	PO2	PO3	PO4	-------
CO1	3	1	2	-----	
CO2	2	2	1	3	
CO3	3	2	3	1	
CO4	1	1	--	--	

PO1 Apply

PO2 Analyze

PO3 Design

PO4 Investigate

PO Attainment – Example

Setting the Target/ Benchmark

- Many methods are available

Method1:

- Same target is identified for all the COs of a course/subject
- Example: the class average mark let say ≥ 70 marks

In this case all the students are kept in one category and all COs are also kept in same level

Example:

Let us consider the case of course title: EM Theory

Here the students are taught Curl, Divergence, Theorems, Maxwell's equations, Boundary conditions, Wave equations, Waveguide etc.,. Each unit of the subject has a different difficulty level and so are the tasks to be performed. Hence, does not give the true outcomes but near value of the expected outcomes

Easy and requires less computation

Method 2:

- Targets are the same for all COs and are set in terms of performance levels of different groups of students
- Classifies Students into different categories, but does not provide any plan for improvement

  15% students below average   60% students at average   25% of students above average

  Let us say average score is 65 to 80 marks

  Appears to be a good system in heterogeneous case

  Computational work is more

  Main aim here to make 15% zero

Method 3:

- Targets are set for each CO separately
- Advantage of finding the difficulty of specific COs
- Set based on average i.e. CO1 80%, CO2 65%, CO3 95%, CO4 98%
- Computation is more and does not give a distribution of performance

Method 4:

- Targets are quantized into certain levels such as Level1, Level 2 and Level 3
- Let set Level 3 as 75% students scoring ≥ 80% mark
- Level 2: 60% students scoring ≥ 80%
- Level 1: 40% Students Scoring ≥ 80%

  - Continuous improvement is to attain Level 3
  - Generally followed method
  - How to fix target whether it is 80 marks or less or more

  For first year 1st Sem: Take average of +2 PCM score or +2 % of Mark

  For rest semesters find the median of formative and summative assessments of at least 3 to 4 batches. Then take average of these medians and ± ø

  Ø is the deviation expected

  - Easy create data sheet and also easy to implement
  - Difficulty in a heterogeneous system to achieve the set level

ECE: 301 COs	Sub: Electromagnetic Theory Statement of COs: At end of the course the student will be able to do:
C301.1	Compute the spatial variations in coordinate system by using various coordinate systems
C301.2	Derive the electric and magnetic force and field intensity for the given charge distributions
C301.3	Apply the knowledge of electro-magnetic to design waveguides
C301.4	Relate the volume charge density and electric flux density in a given boundary value problem
C301.5	Analyze and select a suitable dielectric and magnetic material for cavity resonator application

CO-PO Matrix for a course : In this case EM Theory

Low: 1 Moderate: 2 High: 3

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
C301.1	2		2	3	2	1	2	1	2	3	1	
C301.2	3	1	1	2	2	3	2	3	3	3		
C301.3	2	2		2	1	3	3	2	2	3		
C301.4	1	3	3	1	3	2		2	2	3		3
C301.5	3		1	2	2	2				1		
Avg	11/5= 2.2	6/5= 1.2	7/5= 1.4	10/5= 2	10/5=	11/5= 2.2	7/5= 1.4	8/5= 1.6	9/5= 1.8	13/5= 2.6	1/5= 0.2	3/5= 0.6
Rounded Avg. Attainment	2	1	1	2	2	2	1	2	2	3	0	1

PO Attainment

Avg. Value of PO from Matrix divide by Highest PO level multiply by CO attainment for the course

(Avg.PO/3) X CO attainment

Attainment of PO

COs	CO Attainment	PO1 2	PO2 3	PO3 2	PO4 2	PO5 1	PO6 2	PO7 3	PO8 2	PO9 2	PO 10 1	PO 11 1	PO 12 1
C301.1	2.2	1.47	2,2	1.47		.73							
C301.2	2.8	1.87		1.87	1.87							.93	
C301.3	1.6	1.07	1.6					1.6					.53
C301.4	1.4	.93	1.4	.93		.46							
Attainment		**1.34**	**1.73**	**1.42**	**1.87**	**.59**		**1.6**				**.93**	**.53**

(2.2 x2)/3=1.466=1.47   (2.8 x 2)/3 = 1.866 = 1.87 and so on

PO Attainment - Calculation

Course	COs	Attainment Level Column A	PO1 Ccolumn B	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C3 01	C301.1	1.5	1	1	3	2	2	1	-	1	1	-	-	-	2	2	1
	C301.2	2.1	1	1	3	2	3	1	-	-	1	-	-	-	2	2	1
	C301.3	2.4	1	1	3	3	3	-	-	-	1	2	-	-	3	3	1
	C301.4	2.5	1	1	3	3	3	2	-	-	1	-	-	-	3	3	1
	C301.5	2.4	1	2	3	3	3	-	-	1	1	-	-	1	3	3	1
	C301.6	2.7	1	2	3	3	3	2	-	-	1	2	-	1	3	3	1
C3 02	C302.1	1.8	-	-	-	-	-	-	1	-	2	1	3	-	-	-	-
	C302.2	1.9	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
	C302.3	1.7	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
	C302.4	2.7	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
	C302.5	2.1	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
	C302.6	1.4	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
		Program Outcome Attainmen t	2.27	2.34	2.27	2.33	2.31	2.33	1.93	1.95	2.04	2.40	1.93	2.55	2.33	2.33	2.27

Here only 2 course are taken; for actual calculations all courses to be taken
Calculation: PO1= (column A* Column B)/Sum(column B)
This can be done in excel or spread-sheet tool

PO assessment

Direct 80%	Indirect 20%
• University examination • Internal examination • Tutorials • Class Tests • Direct Assessment Rubrics – Continuous Assessment at laboratory	• Program Exit Survey • Alumni Survey • Employer Survey • External Examiner Feedback • Industrial Visit Evaluation Rubrics • In Plant Training Evaluation Rubrics • Guest Lecture/Workshop/Expert Lecture resource person feedback • Parent Feedback • Students feedback • Co-curricular & Extra Curricular Activities

POs	Exit Survey Question	0	1	2	3	4	5	Total	Weighted Average	% Attainment
PO1	(i)To what level you could apply science, math and engg. Concept to problem solving	0	0	2	3	14	6	25	3.96	76%
	(ii) Your ability to support technical problem solving	0	0	5	4	11	5	25	3.64	
PO2	Ability to analyse ECE problem	0	0	2	5	14	4	25	3.8	76%
PO3	(i)Capability to design ECE components	0	1	4	7	10	3	25	3.4	68%
	(ii) Ability to design ECE system	1	1	1	11	7	4	25	3.36	
PO4	To what Extent you can analyse and interpret data	0	1	1	4	13	6	25	3.88	78%
PO5	Understanding and ability to use modern tools in ECE problem solving	0	0	5	5	11	4	25	3.56	71%

2x2+3x3+14x4+6x5=99/25=3.96 3.96+3.64=7.6=76% 3.8x2=76% and so on

Results of attainment of POs through Semester End Exam (SEE) results,

Sl. no.	Course									marks (%)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1.	Analysis of Structures-II									59%												
2.	Environmental Engineering-I									81%	81%	81%	81%	81%		81%	81%	81%		81%		
3.	Geotechnical Engineering - II									56%												
4.	Highway Engineering									72%	72%	72%	72%	72%		72%		72%		72%		
5.	Hydrology & Water Resources									60%												
6.	Software Applications									75%		75%	75%	75%	75%					75%		75%
7.	Minor Project/Industrial Visit									86%										86%		86%
8.	Design of Steel Structures									56%												
9.	Environmental Engineering-II									70%	70%	70%	70%			70%	70%					
10.	Extensive Survey Project									86%	86%	86%	86%	86%	86%			86%	86%	86%		86%
11.	Pre Stressed Concrete									62%	62%	62%	62%					62%				
12.	Transportation Systems &									68%	68%	68%	68%			68%						

Example: Weightages for PO Attainment

PO No.	Method of Assessment	Direct Assessment (CIE)	Direct Assessment (SEE)	Student Exit Survey	Course End Survey	Faculty Survey	PO Attainment, %
	Weightage / **PO Description**	50%	30%	10%	5%	5%	
PO 1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	38%	22%	7%	4%	4%	76%
PO 2	Identify, formulate, research literature, and analyz e complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	37%	22%	7%	4%	4%	75%
PO 3	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.	32%	23%	7%	3%	3%	68%
PO 4	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.	39%	23%	7%	4%	3%	77%

PO Attainment

- All POs can be adequately addressed through the selection of courses and their COs
- Attainable targets can be selected for each of the CO.
- If assessment is in alignment with COs, the performance of the students indicates the PO attainment.
- These measurements provide the basis for continuous improvement in the quality of learning.

Two-step Process for Bringing Clarity to POs

- POs give useful guidance at the program level for the curriculum design, delivery and assessment of student learning. To connect high-level outcomes (POs) with course content, course outcomes and assessment, there is a necessity to bring further clarity and specificity to the program outcomes . This can be achieved by (i) identifying Knowledge and Skill and (ii) Performance Indicators (PI).

Bringing Clarity to Pos through Competency and PI

(i) Identify knowledge and skill to be attained: For each PO define Knowledge-Skill –different abilities implied by program outcome statement that would generally require different assessment measures. This helps us to create a shared understanding of the knowledge and skill we want students to achieve. They serve as an intermediate step to the creation of measurable indicators.

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 public health and safety, and cultural, societal, and environmental considerations.

Knowledge and Applications Level:

1. Demonstrate an ability to define a complex, open-ended problem in engineering terms.
2. Demonstrate an ability to generate a diverse set of alternative design solutions.
3. Demonstrate an ability to select the optimal design scheme for further development.
4. Demonstrate an ability to advance an engineering design to the defined end state.

(ii) Define Performance Indicators: For each of the competencies identified, define performance Indicators (PIs) that are explicit statements of expectations of the student learning.

Example:

For the Level -2

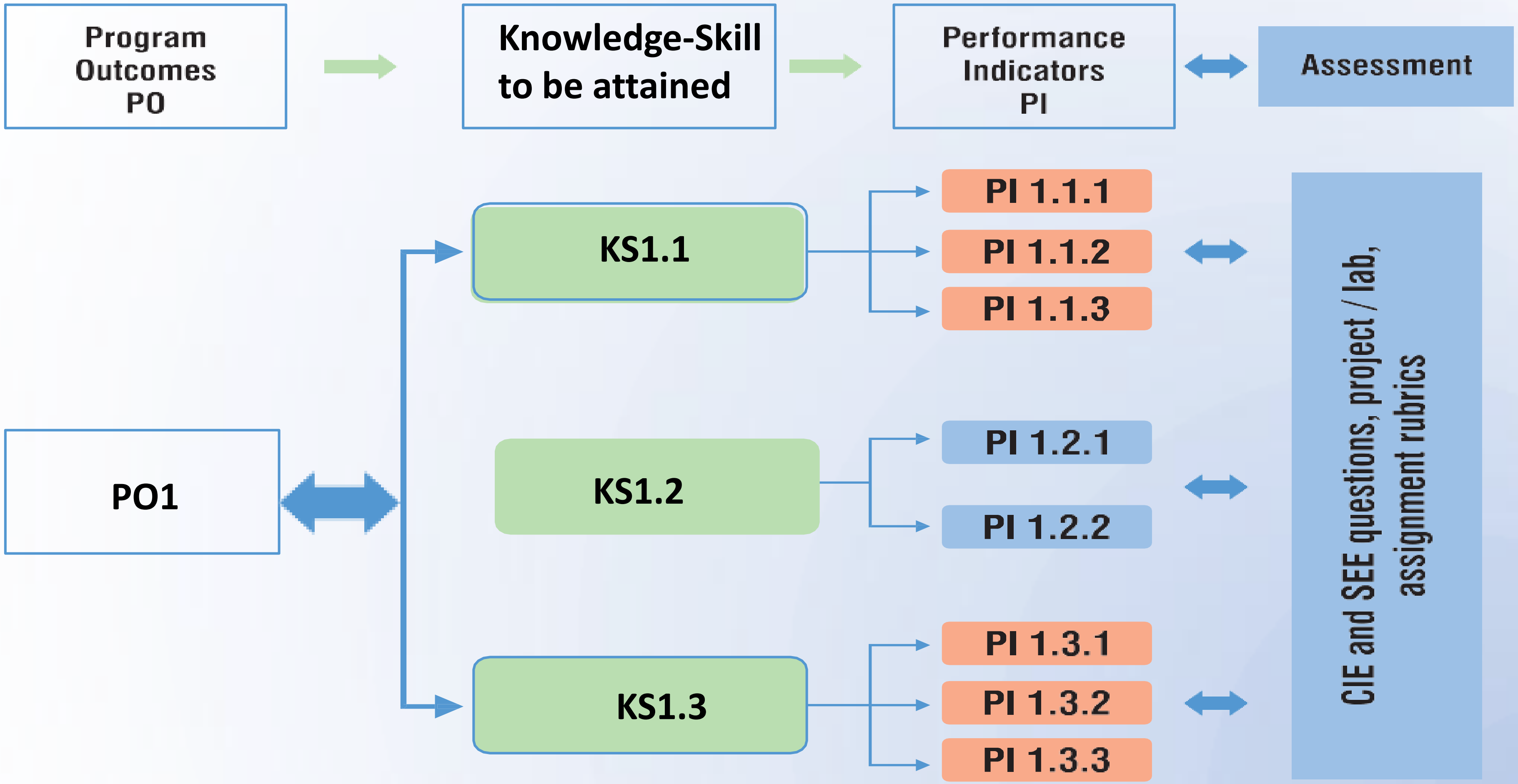
Demonstrate an ability to generate a diverse set of alternative design solutions

Performance Indicators:

1. Apply formal idea generation tools to develop multiple engineering design solutions
2. Build models, prototypes, algorithms to develop a diverse set of design solutions
3. Identify the functional and non-functional criteria for evaluation of alternate design solutions

It should be noted that, when we consider the program outcome, it looks like, it can be achieved only in the Capstone project. But if we consider the knowledge-skill and performance indicators, we start seeing the opportunities of addressing them (and hence PO) in various courses of the program.

POs and Assessment



Design an antenna for mobile phone to radiate in 90 degree with low SAR and with AI support, take a decision on clearance for the company

01 **Engineering Knowledge:** Does it require knowledge math, physical science, engineering fundamental and specialization: **Yes: PO1**

02 **Problem Analysis**: Does it require formulation and survey of research literature: **Yes: PO2**

03 **Design/Development of Solution:** Is it a design problem with consideration for public health: **Yes: PO3**

04 **Conduct investigation:** Does it require research based knowledge and analysis: **Yes: PO4**

05 **Modern Tool Usage:** Is there a need to use ant modern tool **: YES: PO5**

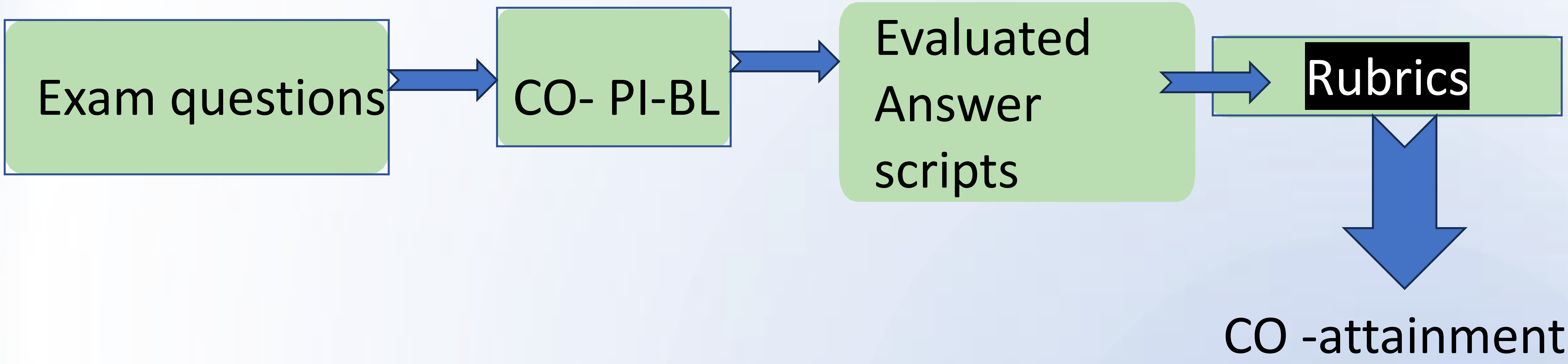
06 **The Engineer and Society:** Does it require professional engineering practice to assess societal health and safety: **Yes PO6**

06 **Environment and sustainability:** Does it relate to sustainability : **NO PO6**

07 **Ethics:** Does it require to apply ethical principle: **Yes PO7**

08-09 **Individual and Team Work:** **Communication:** **Yes**
Project Management and Finance: **Life Long Learning : NO**

Procedure for CO attainment calculation



CO attainment calculation

Reg no	Internal Exams																		University Exams						
	Test 1						Test 2						Project, Assignments, Quiz etc												
	CO1	CO2	CO3	CO4	CO5	Total	CO1	CO2	CO3	CO4	CO5	Total	CO1	CO2	CO3	CO4	CO5	Total	CO1	CO2	CO3	CO4	CO5	Internal	Total
24ECE01	30	40				70			20	30	25	75	17	18	15	9	15	74	9	6	20	13	20	24	92
24ECE02	25	37				62			25	25	25	75	18	14	8	11	9	60	8	7	15	14	19	23	86
24ECE03	10	30				40			14	20	25	59	19	13	11	15	11	69	7	8	20	10	18	21	84
24ECE04	14	20				24			10	17	24	51	20	15	17	14	15	81	6	4	11	5	15	17	58
No. of Students Attended	4	4	4	4	4	4	4	4	4	4	4	4													
Max Mark CO wise	50	50	0	0	0	100	0	0	30	30	40	100	20	20	20	20	20	100	10	10	20	15	20	25	100
Threshold 50%	25	25				50			15	15	20	50	10	10	10	10	10	50	5	5	10	7.5	10	12.5	50
No. of students above threshold	2	3				2			3	4	4	4	4	4	3	3	3	4	4	3	4	3	4	4	4
Level	1	3				1			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Target

50% of students above 50% - 1 (LOW)

60% of students above 50% - 2 (MEDIUM)

70% of students above 50% - 3 (HIGH)

Example

Course: Chemistry

Topic: Salt Preparation

Salt preparation is a process of mixing two or more chemicals through suitable process to make the compound with proper strength, crystallinity and durability as per TATA salt

Students activities

Here students have the choice of selecting different chemicals, select the different processes to produce the salt matching with that of TATA

TEST QUESTION

State the different processes of chemical mixing techniques for salt preparation

PO1: Engineering Knowledge

CO1 : Able to explain chemical mixing techniques for salt preparation

Example

questions

1.Does the test question correlate well with the co1

2.Does this CO1 reflects the intended

measurement from PO 1

Observation

Does not reflect use of math, science and engineering principle and engineering application

It is remembrance only

Test question also does not match PO1

Decision

Correlation between CO-PO is -----------

a. Strong

b. Moderate

c. Weak

Select the correct one

PO1: Engineering Knowledge

CO1 : Able to explain chemical mixing techniques for salt preparation

Subject/Course CHEM-101

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	Remarks
CO 1												
CO 2												
CO 3												
CO n												

3= Strong 2= Moderate 1= Weak

COURSE	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
Subject1	CO1	3	3	-	-	-	-	-	-	-	-	-
	CO2	3	3	-	-	-	-	-	-	-	-	-
Subject2	CO1	3	2	-	3	-	3	3	-	-	-	-
	CO2	3	3	-	-	-	3	3	-	-	3	-
	CO3	-	-	3	-	-	-	3	3	-	3	-
Subject3	CO1	3	3	-	-	-	-	-	-	-	-	-
	CO2	3	3	-	-	-	-	-	-	-	-	-
	CO3	3	3	-	-	-	-	-	-	-	-	-
	CO4	3	3	2	-	-	3	-	-	-	-	-
Subject4	CO1	3	-	-	-	-	-	-	-	-	-	-
	CO2	-	3	3	-	-	-	-	-	-	-	-
	CO3	-	3	3	-	-	-	-	-	-	-	-
	CO4	-	-	-	-	-	-	-	3	3	-	-
Subject5	CO1	3	3	-	-	-	-	-	-	-	-	-
	CO2	3	3	-	-	-	-	-	-	-	-	-
	CO3	3	3	3	-	-	-	-	3	-	-	-
Major Project	CO1	-	-	-	-	-	-	3	-	3	-	-
	CO2	3	3	3	3	-	-	-	3	3	-	-
	CO3	-	-	-	-	3	-	-	-	3	-	-
	CO4	-	-	-	-	-	-	-	-	3	3	2

CO-PO Relationship

Assessment tools

PO/Course Assessment Tool Types	PO/ Course Assessment Tool	1	2	3	4	5	6	7	8	9	10	11	12
Direct Tools	Tests	√	√	√	√								
	Assignments	√	√	√	√		√		√			√	√
	Lab/Seminars/Industrial Training/ Projects (Rubrics)	√	√	√	√	√		√	√	√	√	√	√
Indirect Tools	Course End Survey	√	√	√	√	√	√	√	√	√	√	√	√
	Exit Survey	√	√	√	√	√	√	√	√	√	√	√	√
	Faculty Survey	√	√	√	√	√	√	√	√	√	√	√	√
	Alumni Survey		√			√					√		
	Programme Statistics	√	√					√		√		√	√

CO-attainment for a course

	Program Outcomes	PO1																				
	Max Marks	**10**	**10**	**10**	**10**				40					**5**				5				
	Course Outcomes	**CO1**							TOTAL OBTAINED	TOTAL MARKS ATTEMPTED	PERCENT, %	SCORES OR GRADING BASED ON SCALE OF 3	Target > =70%	CO2				TOTAL OBTAINED	TOTAL MARKS ATTEMPTED	PERCENT, %	SCORES OR GRADING BASED ON SCALE OF 3	Target > =70%
USN	**Name**	T1-Q1.a	T1-Q1.b	T1-Q2.a	T1-Q2.b									**Assignment-1**								
1BM13CCT01	ANUSHA S. B.	8	7	8					23	30	77%	3	Y	3				3	5	60.00%	2	
1BM13CCT02	BHAVISH DAS (discontinued after I sem)	5	6	12	8				31	40	78%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT03	DEEPA M NAIK			8	7				15	20	75%	3	Y	5				5	5	100.00%	3	Y
1BM13CCT04	GOLLAPALLI NIRANJAN REDDY			9	7				16	20	80%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT05	JHANSI RAMA PRIYA			9	9				18	20	90%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT06	NIRANJANA N	7	6	9	3				25	40	63%	2		4				4	5	80.00%	3	Y
1BM13CCT07	PAVAN J.			9	9				18	20	90%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT08	PRAMOD B. V.			10	9				19	20	95%	3	Y	3				3	5	60.00%	2	
1BM13CCT09	PRAVEEN GONGACHI	4	7						11	20	55%	2		4				4	5	80.00%	3	Y
1BM13CCT10	RAJESH A.			9	7				16	20	80%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT11	SALMAN PASHA	7	7	6					20	30	67%	2		4				4	5	80.00%	3	Y
1BM13CCT12	SHARATH R.	7	7	8	8				30	40	75%	3	Y	3				3	5	60.00%	2	
1BM13CCT13	SHRINATH			9	8				17	20	85%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT14	SOWMYA H. V.			9	7				16	20	80%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT15	SUNIL KUMAR B. M.		2	7	7				16	30	53%	2		3				3	5	60.00%	2	
1BM13CCT16	VIKAS PRABHAKAR ATTIGERI			9	8				17	20	85%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT17	VIKRAM C GATEGAR			7	8				15	20	75%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT18	VILASKUMAR S. LONIMATH			8	8				16	20	80%	3	Y	5				5	5	100.00%	3	Y
											SUM	50	14							**SUM**	50	14
										AVG GRADING		2.78							**AVG GRADING**		2.78	

CO-attainment for a course: Contd.

10	10	10	10				40		PERCENT, %	SCORES OR GRADING BASED ON SCALE OF 3	Target > =70%
CO3							TOTAL OBTAINED	TOTAL MARKS ATTEMPTED			
T1-Q3.a	T1-Q3.b	T2-Q2.a	T2-Q2.b								
8	7						15	20	75.00%	3	Y
		5	12				17	20	85.00%	3	Y
6	8	8	5				27	40	67.50%	2	
	9						9	10	90.00%	3	Y
9	9						18	20	90.00%	3	Y
-	-	-	-				0	40	0.00%	1	
-	-	-	-				0	40	0.00%	1	
8	8						16	20	80.00%	3	Y
8	8						16	20	80.00%	3	Y
6	8						14	20	70.00%	3	Y
		7	7				14	20	70.00%	3	Y
-	-	-	-				0	40	0.00%	1	
8	9	8	7				32	40	80.00%	3	Y
9	9						18	20	90.00%	3	Y
5	6						11	20	55.00%	2	
9	8	8	8				33	40	82.50%	3	Y
7	8	8					23	30	76.67%	3	Y
8	9						17	20	85.00%	3	Y
									SUM	46	13
								AVG GRADING		2.56	

CO-attainment for a course: Contd.

COURSE OUTCOMES	GRADING AVG ON SCALE OF 3	DISTRIBUTION %		
		3	2	1
CO1	**2.78**	14 / 18 = 77.77%	4 / 18 = 22.22%	0 / 18 = 0%
CO2	**2.78**	14 / 18 = 77.77%	4 / 18 = 22.22%	0 / 18 = 0%
CO3	**2.56**	13 / 18 = 72.22%	2 / 18 = 11.11%	3 / 18 = 16.66%
CO4	**2.56**	10 / 18 = 55.55%	8 / 18 = 44.44%	0 / 18 = 0%

TARGET is > = More than 75% of Students Must Achieve 70% Marks.

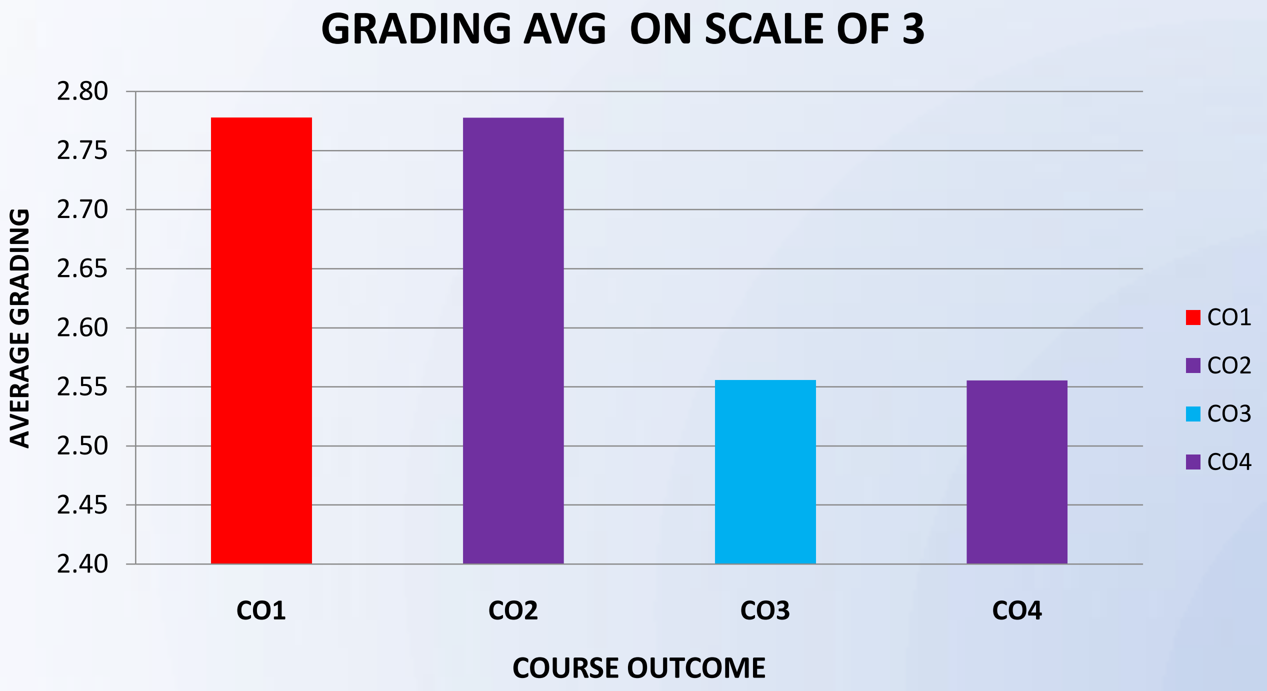
PO AND CO SCALE	**3**	**Strongly Related**
	2	**Moderate**
	1	**Low**

NUMBER OF STUDENTS SCORING > =70%

COURSE OUTCOMES	% OF STUDENTS ACHIEVED CO	CO RESULT
CO1	77.78%	Y
CO2	77.78%	Y
CO3	72.22%	N
CO4	55.56%	N

CO-attainment for a course: Contd.

COURSE OUTCOMES	GRADING AVG ON SCALE OF 3	DISTRIBUTION %		
		3	2	1
CO1	**2.78**	77.78%	22.22%	0.00%
CO2	**2.78**	77.78%	22.22%	0.00%
CO3	**2.56**	72.22%	11.11%	16.67%
CO4	**2.56**	55.56%	44.44%	0.00%



CO Attainment

- The assessments should be in alignment with the COs
- Question paper should be so set to assess all COs
- The average marks obtained in assessments against items for each CO will indicate the CO attainment.
- Instructors can set targets for each CO of his/her course.
- Attainment gaps can therefore be identified.
- Instructor can plan to reduce the attainment gaps or enhance attainment targets.

CO-PO mapping (How to Present)

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) : blank: no correlation

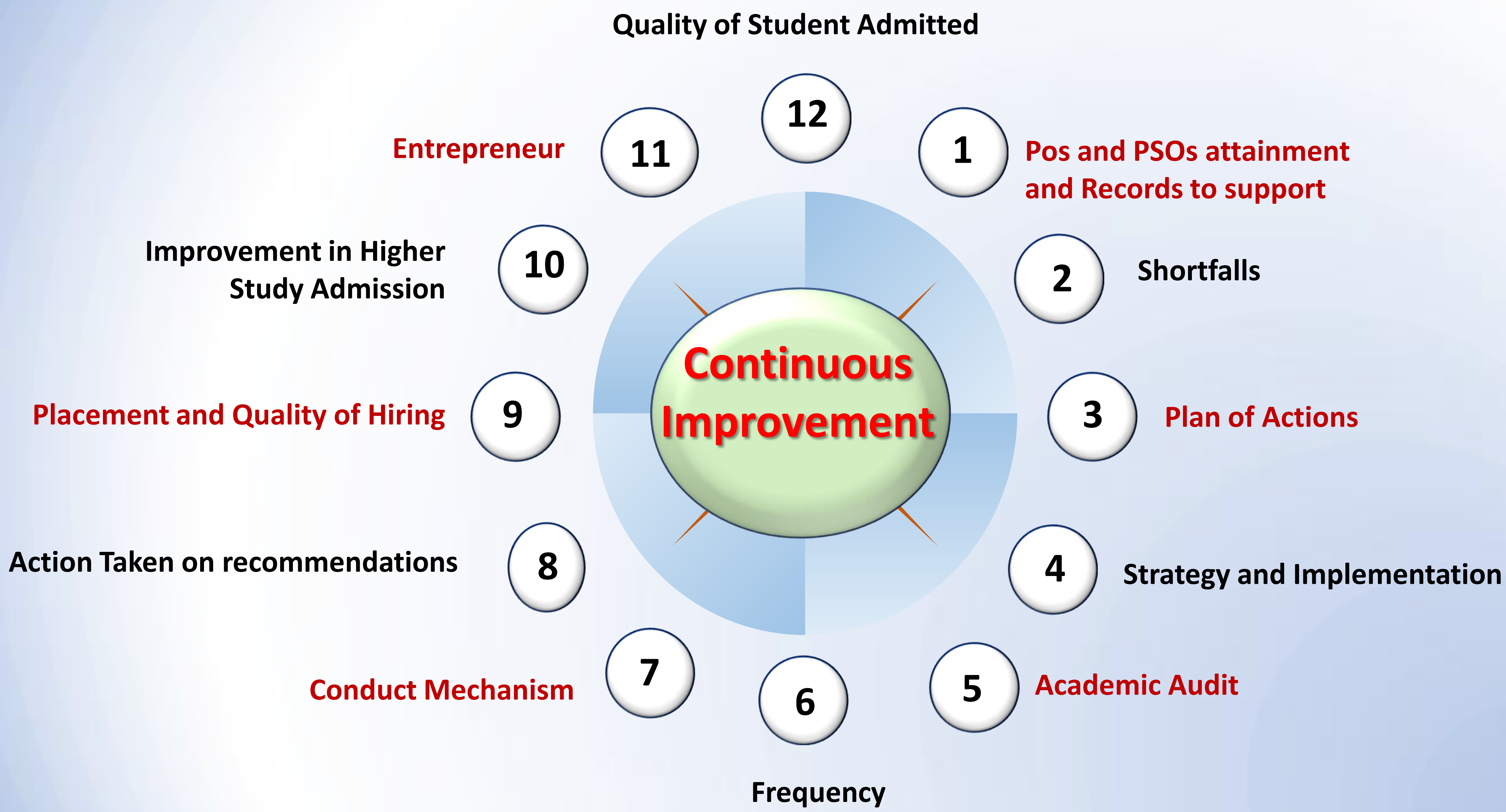
						PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
SEM		SUB CODE	Course	COURSE OUTCOMES	COURSE OUTCOMES Statement												
III	C203	BEXX201	Course name	C203.1	.	3	3	2	2	-	-	3	3	2	2	1	-
				C203.2		-	-	-	-	-	-	3	3	3	2	1	-
				C203.3		-	-	-	-	-	-	3	2	2	2	1	-
				C203.4		-	-	-	-	-	-	3	2	2	2	1	-
				C203.5		-	-	-	-	-	-	2	2	2	2	1	-
				C203.6		-	-	-	-	-	-	2	2	2	2	1	-

Model Question Paper

Course: EM Theory (ECE 503)

Maximum Marks :100; Duration: 03 hours

Q.No	Questions	Marks	CO	BL
1(a)	Explain the steps involved in finding curl of a vector.	08	CO1	L2
1(b)	Apply stoke theorem to solve the given problem	12	CO2	L3
2(a)	State Maxwell’s equations.	08	CO2	L1
2b	Design a cylinrical waveguide with the given parameters and analyse the performance using PML boundary condition	12	CO3	L4
3a	Compare rectangular coordinate system with that of cylindical	08	CO3	L2


Quality of Student Admitted
12
11
Entrepreneur
1
Pos and PSOs attainment and Records to support
10
Improvement in Higher Study Admission
2
Shortfalls
Continuous Improvement
9
Placement and Quality of Hiring
3
Plan of Actions
8
Action Taken on recommendations
4
Strategy and Implementation
7
Conduct Mechanism
6
5
Academic Audit
Frequency

Outcome assessment for improvement

From an SAR of civil Engineering program (accreditation completed)

PO1: Engineering knowledge: Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

Target: 2.5 Set by Department; Calculated attainment: 2.3

The overall attainment of PO1 is near but below the target value;

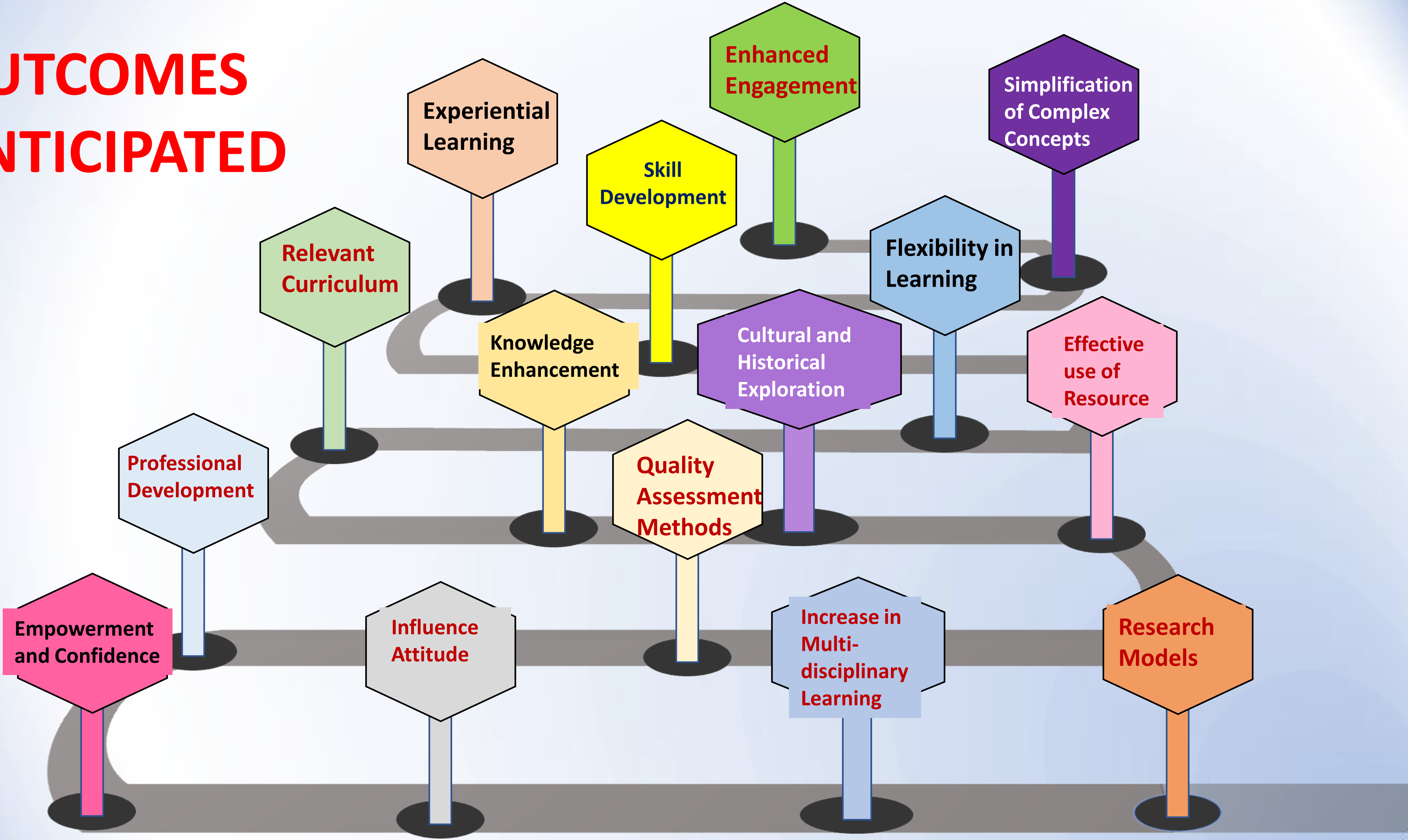
The foundation course Mechanics of Materials (CVC202) has CO attainment below the target. Mathematical courses - Statistics and Integral Transforms (MAC209) and Numerical Methods and Partial Differential Equations (MAC213) have attainment below the target value. These are impacting the PO attainment.

Improvement

This diagnosis indicates insufficient connectivity between the theoretical concepts and their mathematical applications.

- Action 1: Contextual learning pedagogy is used in Mechanics of Materials (15ECVF202) to associate classroom teaching to real-world experiences and improve the grasp of fundamental concepts.
- Action 2: Mathematical courses in the third semester, i.e., Statistics and Integral Transforms (15EMAB202), and in the fourth semester, i.e., Numerical Methods and Partial Differential Equations (15EMAB207) introduced contextual problems of civil engineering.

OUTCOMES ANTICIPATED



Let Us now Define OBE

A process of designing ,revising and restructuring of curriculum and its implementation through innovative T-L and use continuous assessment and evaluation that reflects the achievement of higher order learning and skill rather than accumulation of credits through rote learning thus, making our students capable of solving complex problems using modern tool with values and ethics while keeping sustainability, society, culture and environment in mind.

Learning Principles

Focused (No ambiguity)

Expanded Opportunity

Knowledge, Skill and Attitude Integration

High Expectation

Outputs	Outcomes
•*Activities we do to achieve* outcomes	•Results of the activities to be demonstrated
•Conduct FDP on NBA to train faculty members	•All the departments/Programmes of the institute got accredited
•If the patient having high fever give paracetamol	•Has the patient fever comedown

Revisiting Key Features for Attention

Curriculum Design

- Extent of gaps identification
- Balancing Cognitive, Psychomotor and Affective needs
- Internship or Industry component
- Stake-holders involvement
- Credits through MOOCs
- Mapping with COs and POs

T-L: Implementation

- Innovative pedagogy
- Modern Tools
- Industry Experts
- Involvement in Communities
- Industry Labs
- Beyond Syllabus activities
- Complex Problem exercises
- Peers learning
- Diverse Tasks

Assessment and Evaluation

- Diverse modes of continuous assessment
- Quality of questions or tasks
- Mapping to COs
- Sources of questions and moderation
- Rubrics
- Distribution Slope of the challenges
- Group assessment

Study Undertaken

- Efficacy Study
- Effectiveness Study
- Impact Study
- Feedback Analysis
- Corrective Actions
- Audit both academic and infrastructure
- Involvement of third party

Review Activities

- Curriculum
- Instruction and Instructional Resources
- Integration of modern tools
- Facilities Upgradation
- Industry Tie-up
- Students Achievements
- Policies and Implementation
- Regulatory Requirements

Rubrics

- To grade assessment having more than one correct answer in efficient and equitable way
- Transparency in grading, as well as increase consistency in scoring
- Understand the purpose of an assignment
- Provide peer feedback, or to engage in self-assessment

Elements of Rubrics

- criteria for assessing
- Quality Levels
- Scoring strategy

Criteria

- Criteria define the distinct elements or competent performance of the tasks central to the assignment.
- Generally, 4 to 6 criteria assess the breadth of knowledge or skill that are most essential to an assignment.
- Effectively selecting the most important criteria is the first step to designing analytic rubrics

Quality Levels

- Selecting the number of quality levels is a critical decision
- Research has shown that as the number of quality levels increases, consistency across graders or reviewers decreases
- The labeling of quality levels requires careful reflection. In learning contexts, instructors typically distinguish levels of Knowledge-skill, mastery, or expertise

Scoring Strategy

- 1) Setting weights for each criterion, and single scores for each quality level. This approach speeds grading and minimizes discretion that might be a source of bias
- 2)Weighting criteria and providing a range of scores for each quality level. This approach supports instructors interested in making more fine-grained distinctions.
- 3)Focusing on the overall combination of quality levels across criteria to assign a grade. This is a simplified grading structure that focuses on the overall grade and holistic judgment of the instructor or grader. For larger course enrollments, this strategy increases the risk of inconsistent or biased grading.

Creating Rubrics

- **Determine the purpose of the assignment**
- **Clearly establish criteria**
- **Determine the scoring method**
- **Develop the descriptors of the criteria**
- **Be sensitive to language used**
- **Explore results with hypothetical scoring combinations**

Rubrics Tools

- Gradescope is a tool that enables efficient and transparent grading. It prompts instructors to grade by question rather than by student.
- The Canvas Rubrics Tool can help you grade more quickly by providing an easy way to select the appropriate feedback, or grade by the same criteria for each student.
- Canvas automatically calculates the total score for you in Speed-grader.

Analytic Rubrics

	Needs Improvement (1)	Developing (2)	Sufficient (3)	Above Average (4)
Clarity (Thesis supported by relevant information and ideas.)	The purpose of the student work is not well-defined. Central ideas are not focused to support the thesis. Thoughts appear disconnected.	The central purpose of the student work is identified. Ideas are generally focused in a way that supports the thesis.	The central purpose of the student work is clear and ideas are almost always focused in a way that supports the thesis. Relevant details illustrate the author's ideas.	The central purpose of the student work is clear and supporting ideas always are always well-focused. Details are relevant, enrich the work.
Organization (Sequencing of elements/ideas)	Information and ideas are poorly sequenced (the author jumps	Information and ideas are presented in an order that the	Information and ideas are presented in a logical sequence	Information and ideas are presented in a logical sequence

Developmental Rubrics

Domain	Initial Level of Development (1)	Intermediate Level of Development (2)	Mature Level of Development (3)
Cognitive	Assumes knowledge is certain and categorizes knowledge claims as right or wrong; is naive about different cultural practices and values; resists challenges to one's own beliefs and views differing cultural perspectives as wrong	Evolving awareness and acceptance of uncertainty and multiple perspectives; ability to shift from accepting authority's knowledge claims to personal processes for adopting knowledge claims	Ability to consciously shift perspectives and behaviors into an alternative cultural worldview and to use multiple cultural frames

Holistic Rubrics

Criterion	Excellent	Good	Adequate	Poor
Site Visits Notes	Every site visit includes good and thoughtful notes about that site	Every site has notes, but one or two days are not good/thoughtful notes OR one day of notes is missing	Every site has notes, but three of four days are not good/ thoughtful notes OR two days of notes are missing	Not every day has good/ thoughtful notes OR more than two days of notes are missing
Class Question	Not every day has good/ thoughtful notes OR more than two days of notes are missing	Is missing answers to no more than 8 questions across the site visits	Is missing answers to no more than 12 questions across the site visits	Is missing answers to more than half of the questions across the site visits
Reflection on Site Visits	Provided thoughtful reflection on	Provided thoughtful reflection on at least 4 of the site visits OR provided	Provided thoughtful reflection on at least 3 of the site visits	at least 3 of the site visits OR provided

Checklist

Criterion	Yes	No
All Sites have Notes		
Sites Notes are Thorough		
Site Notes are Thoughtful		
Answers all Site Questions for All Sites		
Provided Reflection on each of the 6 Site Visits		
Reflection on Site Visits was Thoughtful		

Research Paper

Criteria	Excellent (3 points)	Good (2 points)	Poor (1 point)
Number of sources	Ten to twelve	Five to nine	One to four
Historical accuracy	No apparent inaccuracies	Few inaccuracies	Lots of historical inaccuracies
Organization	Can easily tell from which sources information was drawn	Can tell with difficulty from where information came	Cannot tell from which source information came
Bibliography	All relevant bibliographic information is included	Bibliography contains most relevant information	Bibliography contains very little information

Appreciate your Attention and Time.

Thank You

NBA Awareness Workshop

MSRIT , Bengaluru

22nd March, 2025

Prof. R.V. Ranganath
Dean (Academics), M.S. Ramaiah University of Applied Sciences, Bangalore

Self Assessment Report (SAR) - 2025

Undergraduate Engineering Programs

(GAPC V 4.0)

(TIER-I – Institutions)

SAR Context

- Provides preparedness status at I/P level for the NBA visit,
- Provides the first impression about the I/P to the evaluation team,
- Presents crisp program status to the evaluation team and addresses process and the extent to which, a program meets each criterion,
- Provides documented evidences, which the evaluation team maps/matches with the visual /oral evidences during the visit.

SAR Contents

Serial Code & Link to the Item	Item
PART A	**Institutional Information**
PART B	**Criteria Summary**
	Program Level Criteria
Criterion 1	Outcome-Based Curriculum
Criterion 2	Outcome-Based Teaching Learning
Criterion 3	Outcome-Based Assessment
Criterion 4	Students' Performance
Criterion 5	Faculty Information
Criterion 6	Faculty Contributions
Criterion 7	Facilities and Technical Support
Criterion 8	Continuous Improvement
	Institute Level Criteria
Criterion 9	Student Support and Governance
Annexure I	Knowledge and Attitude Profile (WK)
Annexure II	Program Outcomes (POs) & Program Specific Outcomes (PSOs)
PART C	Declaration by the Institution
	Annexure-III: Allied Departments

PART A: Institutional Information

1. **Name and Address of the Institution:**

2. **Type of the Institution: (Tick the applicable choice)**

   - Institute of National Importance ☐
   - Deemed to be University ☐
   - University ☐
   - Autonomous ☐
   - Non-Autonomous (Affiliated) ☐
   - Any Other (Please specify*) ☐

   *Provide Details: ____

Note:

- In case of Autonomous Institute/Deemed University, mention the year of grant of status by the authority. In case of autonomous institution, mention also the duration of status.
- In case of University Constituent Institution, please indicate the academic autonomy status of the Institution as defined in 12th Plan guidelines of UGC. Institute should apply for Tier 1 only when fully academically autonomous.

3. **Year of Establishment of the Institution:**

4. **Ownership Status: (Tick the applicable choice)**

   - Central Government ☐
   - State Government ☐
   - Grant-in-Aid ☐
   - Self-financingTrust ☐
   - Any Other (Please specify*) ☐

   *Provide Details: ____

5. **Name and Address of the Affiliating University (if any):**

6. **Other Academic Institutions Run by Trust/Society/etc., if any:**

Table No. A6: List of all Institutions running under the same trust/society.

S. N.	Name of the Institution(s)	Year of Establishment	Programs of Study	Location
1	..	..	..	..
...				

7. Details of all the Programs being Offered by the Institution:

Table No. A7: Details of all the programs being offered by the Institution.

S. N.	Program Name	Year of start	Sanctioned Intake	Increase/ decrease in intake, if any	Year of increase/ decrease	AICTE/ Approval details	Accreditation Status*	No. of times program accredited
1.								
..								

Add rows as needed

*Write applicable one:

- Applying first time
- Granted accreditation for 2/3 years for the period (specify period)
- Granted accreditation for 5/6 years for the period (specify period)
- Not accredited (specify visit dates, year).
- Withdrawn (specify visit dates, year)
- Not eligible for accreditation.
- Eligible but not applied.

8. Programs to be Considered for Accreditation vide this Application:

Table No. A8.1: List of programs to be considered for accreditation.

S. N.	Name of the Department	Name of the Program
1.		
...		

Note:

- Keep a list of programs applying for NBA accreditation through this application.

Table No. A8.2: Allied Department(s) to the Department of the programs considered for accreditation as above.

S. N.	Name of the Department (in table no. A8.1)	Name of allied Departments/Cluster (for table no. A8.1)
1.		
...		

Note:

- Keep a list of all allied departments/cluster programs with respect to Table No. A8.1.
- See the Allied Departments/Cluster programs information in Annexure-III.

Example for **Table No. A8.1**: List of programs to be considered for accreditation.

Table No. A8.1: List of programs to be considered for accreditation.

S. N.	Name of the Department	Name of the Program
1.	Computer Science and Engineering	BE (Computer Science and Engineering)
2	Electronics and Communication Engineering	BE (Electronics and Communication Engineering)
3	Mechanical Engineering	BE (Mechanical Engineering)
4	Electrical Engineering	BE (Electrical Engineering)
5	Chemical Engineering	BE (Chemical Engineering)

Example for **Table No. A8.2**: Allied Department(s) to the Department of the programs considered for accreditation as above.

Table No. A8.2: Allied Department(s) to the Department of the programs considered for accreditation as above.

S. N.	Name of the Department (in table no. A8.1)	Name of allied Departments/Cluster (for table no. A8.1)
1.	Computer Science and Engineering	Information Technology
2	Computer Science and Engineering	Computer Science and Engineering & Business Systems
3	Computer Science and Engineering	Artificial Intelligence and Machine learning
4	Electronics and Communication Engineering	Electronics & Telecommunication Engineering
5	Electronics and Communication Engineering	Communication Engineering
6	Mechanical Engineering	Industrial and Production Engineering
7	Electrical Engineering	Electrical Engineering Industrial Control

9. **Total Number of Faculty Members in Various Departments:**

Table No. A9: No. of faculty members in various departments.

S. N.	Name of the Department	Number of faculty members in the Department (UG and PG)											
		CAY				CAYm1				CAYm2			
		No. of Professors	No. of Associate Professors	No. of Assistant Professors	Total faculty members	No. of Professors	No. of Associate Professors	No. of Assistant Professors	Total faculty members	No. of Professors	No. of Associate Professors	No. of Assistant Professors	Total faculty members
1													
...													

10. Total Number of Engineering Students in Various Departments:

Table No. A.10: No. of engineering students in various departments.

S. N.	Name of the Department	Number of students in the Department (UG and PG)		
		CAY	CAYm1	CAYm2
1				
....				

Note:

In case the institution is running programs other than engineering programs (UG and PG), a separate table giving similar details is to be included.

11. Vision of the Institution:

12. Mission of the Institution:

13. Contact Information of the Head of the Institution and NBA Coordinator:

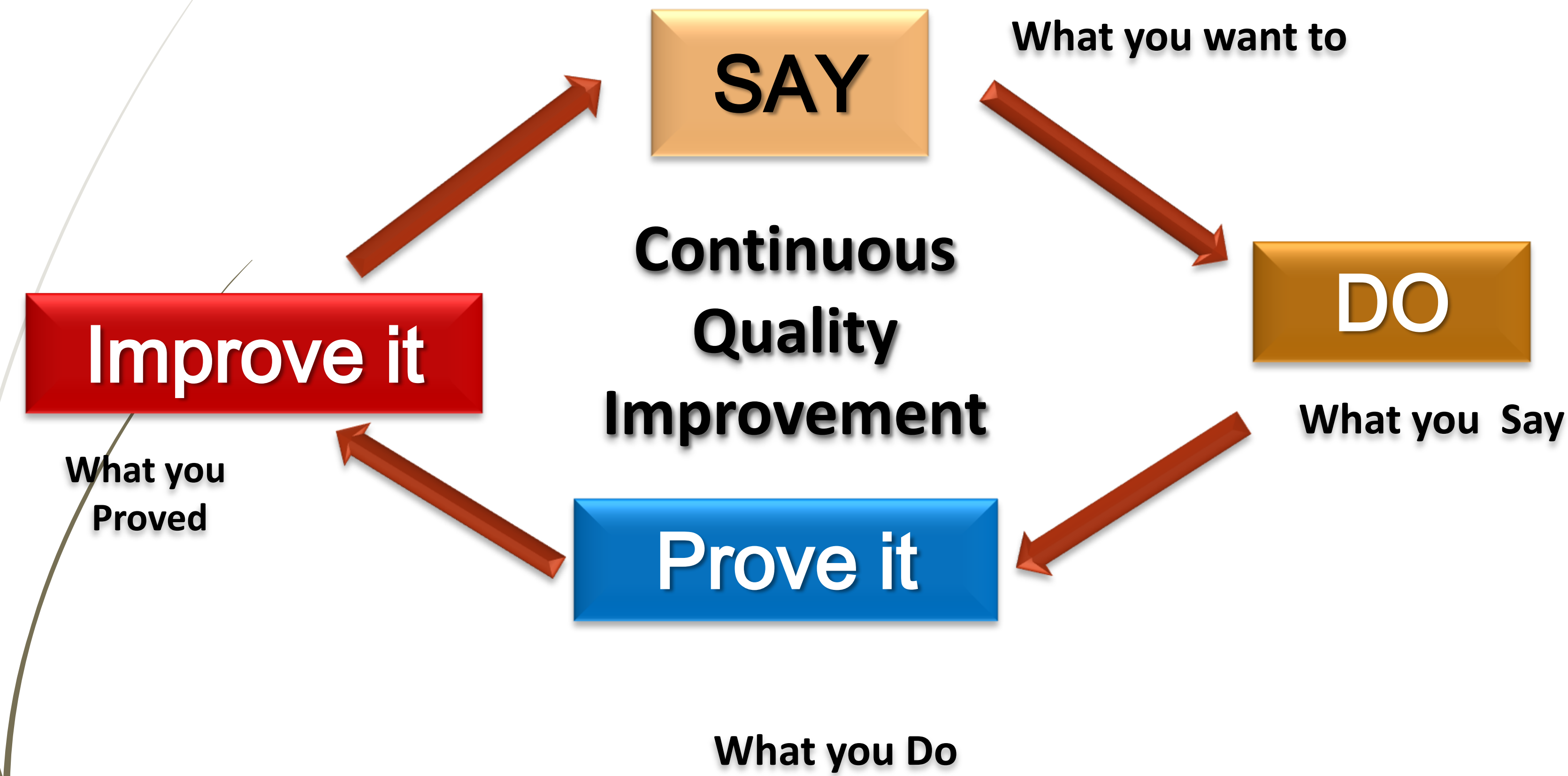
A. **Head of the Institution**

- Name:
- Designation:
- Mobile Number:
- Email id:

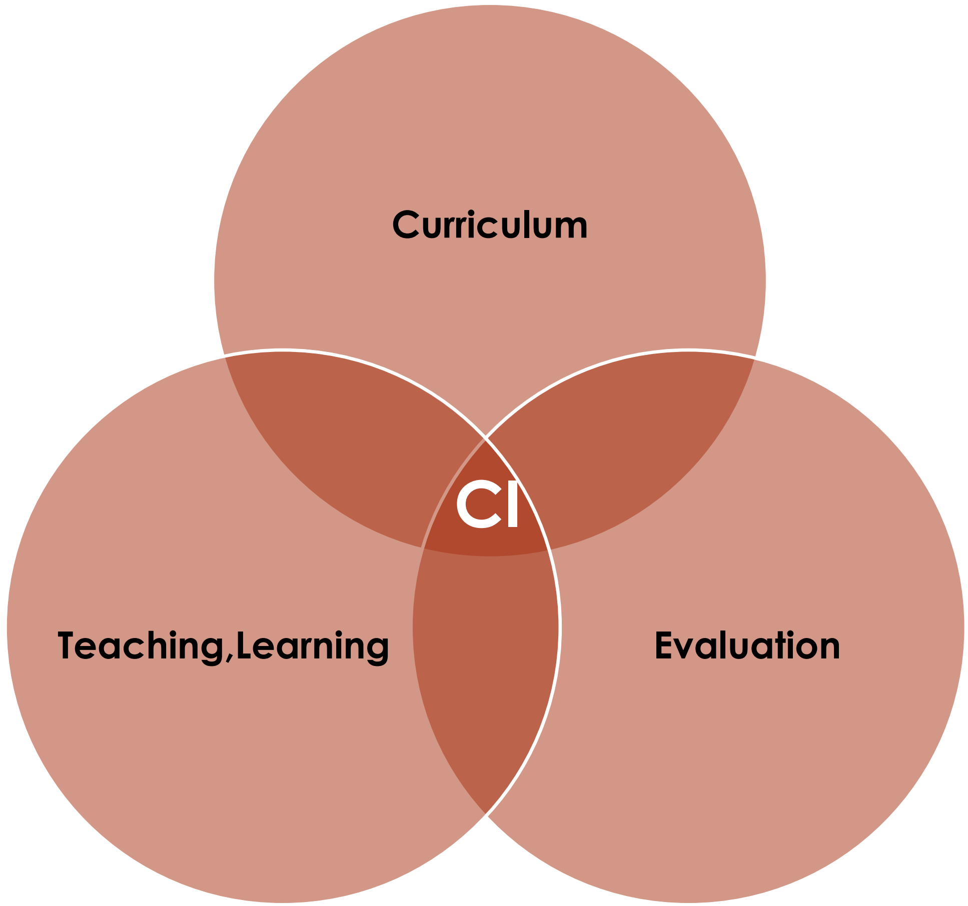
B. **NBA Coordinator:**

- Name:
- Designation:
- Mobile Number:
- Email id:

Continuous Quality Improvement



OBE 3 Pillars….



PART B: Criteria Summary

Name of the Program: ______________________________________

Title of the Degree: ____

Criteria No.	Name of the Criteria	Marks/ Weightage
Program Level Criteria		
1	Outcome-Based Curriculum	120
2	Outcome-Based Teaching Learning	120
3	Outcome-Based Assessment	120
4	Students' Performance	120
5	Faculty Information	100
6	Faculty Contributions	120
7	Facilities and Technical Support	100
8	Continuous Improvement	80
Institution Level Criteria		
9	Student Support and Governance	120
	Total Marks/Weights	**1000**

Comparison of Marks/Weightage between Tier-I & Tier-II

Program Level Criteria			
Criterion's		**Tier-I**	**Tier-II**
Criterion 1	Outcome-Based Curriculum	120	120
Criterion 2	Outcome-Based Teaching Learning	120	120
Criterion 3	Outcome-Based Assessment	120	120
Criterion 4	Students' Performance	120	120
Criterion 5	Faculty Information	100	100
Criterion 6	Faculty Contributions	120	120
Criterion 7	Facilities and Technical Support	100	100
Criterion 8	Continuous Improvement	80	80
Institution Level Criteria			
Criterion 9	Student Support and Governance	120	120

Comparison of Marks/Weightage between Tier-I & Tier-II

Criterion's		Tier-I	Tier-II	
Criterion 1	**Outcome-Based Curriculum**	**120**	**120**	**Outcome-Based Curriculum**
1.1	**Vision, Mission and Program Educational Objectives (PEOs)**	**35**	**40**	**Vision, Mission and Program Educational Objectives (PEOs)**
1.1.1.	State the Vision and Mission of the Institute and the Department	05	05	State the Vision and Mission of the Institute and the Department
1.1.2.	State PEOs of the Program	05	05	State PEOs of the Program
1.1.3.	Process of Defining Vision, Mission and PEOs	10	15	Process of Defining Vision, Mission and PEOs
1.1.4.	Dissemination of Vision, Mission and PEOs	05	05	Dissemination of Vision, Mission and PEOs
1.1.5.	Mapping of PEOs with Mission	10	10	Mapping of PEOs with Mission

PART B: *Program Level Criteria*

1.1. Vision, Mission and Program Educational Objectives (PEOs) (35)

(*Provide details of vision and mission and program education objectives.)*

1.1.1. State the Vision and Mission of the Institute and the Department (05)

(Vision statement typically indicates aspirations and Mission statement states the broad approach to achieve aspirations.)

1.1.2. State PEOs of the Program (05)

(State the PEOs (3 to 5) of program seeking accreditation.)

Vision and Mission Statements

(as per NBA document)

Vision is a futuristic statement that the institution would like to achieve over a long period of time, and Mission is the means by which it proposes to move toward the stated Vision

Example..

Action verb ??

Vision:

To emerge as one of the nation's finest Institutions in the field of Technical Education and Research through focused, effective and sustained monitoring of its programmes and resources.

Mission:

To develop high quality professionals ingrained in ethics, wisdom and creativity for the betterment of the society.

Corrected Vision and Mission Statements

Vision:.

To emerge as one of the nation's finest Institutions of higher learning in the field of Technical Education to develop professionals who are technically competent, ethical, environment friendly for betterment of society.

Mission:

Accomplish stimulating learning environment for students through quality teaching, research and outreach activity by providing state of the art facilities, industry exposure and guidance of dedicated faculty

Department Vision and Mission Statements
(Sample)

Vision:

To be an excellent centre for imparting quality higher education in Civil Engineering for a constantly changing societal needs with credibility, integrity and ethical standards.

Mission:

Accomplish excellence in curricular, co-curricular activities with a committed faculty through teaching and research which creates technically competent and dedicated civil engineers to serve their surroundings with pride.

Program Educational Objective-PEO

- The educational objectives of an engineering degree program are the statements that describe the expected achievements of graduates in their career, and also in particular, **what the graduates are expected to perform and achieve during the first few years after graduation**.
- The PEOs, may be guided by global and local needs, vision of the Institution, long term goals etc.
- For defining the PEOs the faculty members of the program must continuously work with all Stakeholders: Local Employers, Industry, Students and the Alumni

PEOs (Samples)

PEO1:

Graduate will compete on a global platform to pursue their professional career in Electrical Engineering and allied disciplines.

PEO2:

Graduates will pursue higher education and/or engage in continuous up gradation of their professional skills.

PEO3:

Graduate will communicate effectively and will demonstrate professional behaviour while working in diverse team.

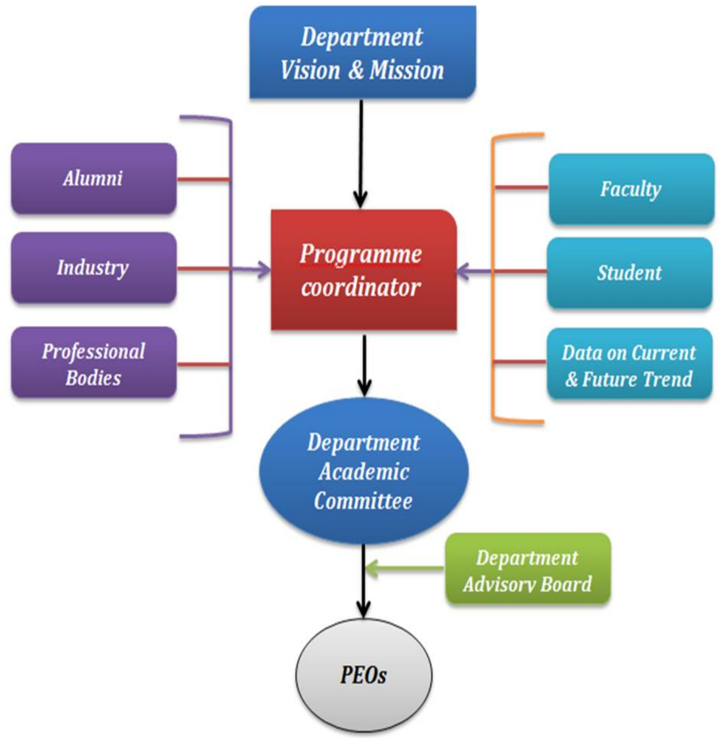
PEO4:

Graduates will demonstrate concern for society and environment.

Criterion 1: Outcome-based Curriculum (120)

1.1.3. Process of Defining Vision, Mission and PEOs (10)

(Articulate the process involved in defining the Vision and Mission of the department and PEOs of the program.)



1.1.4. Dissemination of Vision, Mission and PEOs (05)

(Describe where (websites, curricula, posters etc.) the Vision, Mission and PEOs are published and detail the process which ensures awareness among internal and external stakeholders with effective process implementation.

1.1.5. Mapping of PEOs with Mission (10)

(Generate a Mission of the Department–PEOs matrix with justification and rationale of the mapping.)

Table No.1.1.5.1: Mapping of PEOs with mission

PEO Statements	**M_1**	**M_2**	**....**	**M_n**
PEO1:				
PEO2:				
PEON:				

Note:

❖ M_1, M_2. . . M_n are distinct elements of mission statement. Enter correlation levels as Low (1), Medium (2) and High (3). If there is no correlation, put "-"

Mission of the Department:

- M1: Make competent Civil Engineers with high level of professional, moral and ethical values
- M2:Impart highest standards in theoretical as well as practical knowledge and skill set
- M3:Establish Center of Excellence in major areas of Civil Engineering to respond to the current and future needs of the industry

- PEO1: Graduates will have successful career in the field of Civil Engineering
- PEO2: Graduates will respond to growing demands of society through professional and ethical practices
- PEO3: Graduates will pursue lifelong learning including higher studies in the field of Civil Engineering

What is Expected here ?

Establish consistency of PEOs with Mission of the Department (15)

Generate a “Mission of the Department – PEOs matrix” with justification and rationale of the mapping

PEO Statements	M1	M2	……	Mn
PEO 1	3/2/1 ?	3/2/1 ?		
PEO 2				
PEO 3	3/2/1 ?			

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1.2. Curriculum Structure and Features (30)

1.2.1. State the Process for Developing/Revising the Program Curriculum (10)

Describe the process that periodically documents and demonstrates how the program curriculum has evolved, considering the Washington Accord Knowledge and Attitude Profile (WKs) and the Program Outcomes (POs) defined by the NBA, as listed in Annexure-II.

(Describe the process involving both internal and external stakeholders in framing the curriculum.)

Criterion 1: Outcome-based Curriculum (120)

1.2.2. Curriculum Structure (10)

(Provide details of courses in terms of teaching and learning scheme and number of credits in the Program curriculum.)

Table No.1.2.2.1: Details of various courses presented in terms of teaching and learning scheme.

Course Code	Course Title	Teaching & Learning Scheme					
		Class room Instruction (CI) (in hours per semester		Lab Instruction (LI) (in hours per semester	Team Work (TW) Self Leaning (SL) (TW+SL)(in hours per semester)	Total no. of Hours per semester	Total Credits (C)* (Total Hours/30)
		L	T	P	SL		
101	C++	42	14	28	36	120	120/30=4
102	Chemistry Lab			42	18	60	60/30=2
...							

This is as per the new National Credit Framework, which accounts for 30 hrs. of learning as equivalent to 1 credit. Those universities which are still following the LTP will transform them into no. of hours and fill in the above table.

Criterion 1: Outcome-based Curriculum (120)

1.2.3. Components of Curriculum (05)

(Provide details of Curriculum components for all relevant Years.)

Table No.1.3.3.1: Program curriculum grouping based on curriculum components.

Curriculum Component	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total number of credits
Basic Sciences			
Basic Engineering			
Humanities and Social Sciences			
Program Core			
Program Electives			
Open Electives			
Project(s)			
Internships/Seminars			
Any other (Please specify)			
		Total number of Credits:	

Add more rows, if required

Tier 2

1.2.3. State the Process Used to Identify Extent of Compliance of the University Curriculum for Attaining the Program Outcomes and Program Specific Outcomes as mentioned in Annexure II. Also Mention the Identified Curricular Gaps, if any (10)

(Describe the process that periodically documents and demonstrates how the program curriculum is evolved, or provide the process of gap analysis, whichever is applicable, considering the Program Outcomes (POs) as mentioned in Annexure-II.)

Note: In case all POs are being demonstrably met through University curriculum then 1.2.4 will not be applicable and the weightage of 1.2.3 will be 20.

1.2.4. State the Delivery Details of the Content beyond the Syllabus for the Attainment of Program Outcomes and Program Specific Outcomes (10)

(Provide details of the value-added courses, workshops, seminars, hands-on experiences, etc., organized to address the gaps identified in 1.2.2 in the following format.).

Table No.1.2.4.1: Details of events organized to cover content beyond the syllabus

S. N.	PO/PSO as gap Identified	Name of the event	Date of event	Resource person, organization	Relevance to POs, PSOs
			CAYm1		
1					

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1.2.4. Strategies for Education Reforms (05)

(A brief explanation of the plans to implement and map activities in curriculum design with multidisciplinary and interdisciplinary programs, the establishment of an academic bank of credits system, APAAR etc.)

1.3. PO, PSO and their Mapping with Courses (20)

1.3.1. POs and PSOs (05)

(Program Specific Outcomes (PSOs) are defined by the program, with up to 3 PSOs specified.)

List of POs as Defined by NBA in Annexure II.

List of PSOs (up to 3)

(Provide details of the PSOs for the program currently seeking accreditation.)

POs (Defined by NBA)

- **PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.**
- **PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)**
- **PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)**
- **PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).**
- **PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)**
- **PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).**

POs (Defined by NBA)

- **PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)**
- **PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.**
- **PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences**
- **PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.**
- **PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)**

- **Program Specific Outcomes (PSOs) up to 2-3.**

Programme Specific Outcomes

- There should not be any repetition of POs already defined by NBA.
- Specific to the particular program
- 2 to 3 in number
- Must have a process for arriving at them

Key Points in GAPC 4:

- Knowledge Profiles needs to be ascertained.
- Complex Engineering Problems /activities to be met as per definition
- Sustainability issues to be addressed while solving CEP

Knowledge and Attitude Profile

A Washington Accord program provides:	**A Sydney Accord program** provides:
WK1: A systematic, theory-based understanding of the **natural sciences** applicable to the discipline and awareness of relevant **social sciences**	**SK1:** A systematic, theory-based understanding of the **natural sciences** applicable to the sub-discipline and awareness of relevant **social sciences**
WK2: Conceptually-based **mathematics**, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline	**SK2:** Conceptually-based **mathematics**, numerical analysis, , data analysis, statistics and formal aspects of computer and information science to support detailed consideration and use of models applicable to the sub-discipline
WK3: A systematic, theory-based formulation of **engineering fundamentals** required in the engineering discipline	**SK3:** A systematic, theory-based formulation of **engineering fundamentals** required in an accepted sub-discipline
WK4: Engineering **specialist knowledge** that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.	**SK4:** Engineering **specialist knowledge** that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports **engineering design and operations** in a practice area	**SK5:** : Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports **engineering design and operations** using the technologies of a practice area
WK6: Knowledge of **engineering practice** (technology) in the practice areas in the engineering discipline	**SK6:** Knowledge of **engineering technologies** applicable in the sub-discipline

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development*	**SK7 Knowledge** of the role of technology in society and identified issues in applying engineering technology, such as public safety and sustainable development*
WK8: Engagement with selected knowledge in the current **research literature** of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues	**SK8** Engagement with the current **technological literature** of the discipline and awareness of the power of critical thinking
WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes	**SK9: Ethics, inclusive behavior and conduct.** Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes

*Represented by the 17 UN Sustainable Development Goals (UN SDG)

Complex Engineering Problems

Range of Problem Identification and Solving

References included are to the Knowledge and Attitude Profile in 5.1

In the context of both Graduate Attributes and Professional Competences:			
Attribute	*Complex Engineering Problems* have characteristic WP1 and some or all of WP2 to WP7:	***Broadly-defined Engineering Problems* have characteristic SP1 and some or all of SP2 to SP7:**	*Well-defined Engineering Problems* have characteristic DP1 and some or all of DP2 to DP7:
Depth of Knowledge Required	**WP1:** Cannot be resolved without in-depth engineering knowledge at the level of one or more of WK3, WK4, WK5, WK6 or WK8 which allows a fundamentals-based, first principles analytical approach	**SP1:** Cannot be resolved without engineering knowledge at the level of one or more of SK 4, SK5, and SK6 supported by SK3 with a strong emphasis on the application of developed technology	**DP1:** Cannot be resolved without extensive practical engineering knowledge as reflected in DK5 and DK6 supported by theoretical knowledge defined in DK3 and DK4
Range of conflicting requirements	**WP2:** Involve wide-ranging and/or conflicting technical, non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements	**SP2:** Involve a variety of conflicting technical and non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements	**DP2:** Involve several technical and non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements
Depth of analysis required	**WP3:** Have no obvious solution and require abstract thinking, creativity and originality in analysis to formulate suitable models	**SP3:** Can be solved by application of well-proven analysis techniques and models	**DP3:** Can be solved in standardized ways
Familiarity of issues	**WP4:** Involve infrequently encountered issues or novel problems	**SP4:** Belong to families of familiar problems which are solved in well-accepted ways	**DP4:** Are frequently encountered and thus familiar to most practitioners in the practice area
Extent of applicable codes	**WP5:** Address problems not encompassed by standards and codes of practice for professional engineering	**SP5:** Address problems that may be partially outside those encompassed by standards or codes of practice	**DP5:** Addresses problems that are encompassed by standards and/or documented codes of practice
Extent of stakeholder involvement and conflicting requirements	**WP6:** Involve collaboration across engineering disciplines, other fields, and/or diverse groups of stakeholders with widely varying needs	**SP6:** Involve different engineering disciplines and other fields with several groups of stakeholders with differing and occasionally conflicting needs	**DP6:** Involve a limited range of stakeholders with differing needs
Interdependence	**WP 7:** Address high level problems with many components or sub-problems that	**SP7:** Address components of systems within complex engineering problems	**DP7:** Address discrete components of engineering systems

Complex Engineering Problems

Range of Problem Identification and Solving

References included are to the Knowledge and Attitude Profile in 5.1

In the context of both Graduate Attributes and Professional Competences:		
Attribute	*Complex Engineering Problems* have characteristic WP1 and some or all of WP2 to WP7:	***Broadly-defined Engineering Problems*** **have characteristic SP1 and some or all of SP2 to SP7:**
Depth of Knowledge Required	**WP1:** Cannot be resolved without in-depth engineering knowledge at the level of one or more of WK3, WK4, WK5, WK6 or WK8 which allows a fundamentals-based, first principles analytical approach	**SP1:** Cannot be resolved without engineering knowledge at the level of one or more of SK 4, SK5, and SK6 supported by SK3 with a strong emphasis on the application of developed technology
Range of conflicting requirements	**WP2:** Involve wide-ranging and/or conflicting technical, non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements	**SP2:** Involve a variety of conflicting technical and non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements
Depth of analysis required	**WP3:** Have no obvious solution and require abstract thinking, creativity and originality in analysis to formulate suitable models	**SP3:** Can be solved by application of well-proven analysis techniques and models
Familiarity of issues	**WP4:** Involve infrequently encountered issues or novel problems	**SP4:** Belong to families of familiar problems which are solved in well-accepted ways
Extent of	**WP5:** Address problems not encompassed	**SP5:** Address problems that may be


SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

3

4

6

7

11

12

13

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1.3.2. Mapping between the Courses and POs/PSOs (15)

(Mention the courses relevant to the POs/PSOs.)

Table No.1.3.1: Connection of courses with POs/PSOs.

PO Number	List of Courses
PO1:	
PO2:	
PON:	

Add more rows for PSOs

PO	List of Courses
PO1:	Core Science Courses, CE307 Fluid Mechanics, Engineering geology, biology for engineers.,
PO2:	CE321 Structural Analysis, CE310 Hydraulic Engineering, CE490 Civil Engineering Design Project.
PO3	CE328 Foundation Engineering, CE342 Fundamentals of Reinforced Concrete, CE310 Hydraulic Engineering, CE 572 Steel design, CE490 Civil Engineering Design Project
PO6	Environmental engineering, Transoration Engineering, Hydrology and Water Resources, RCC structures, RS & GIS,
PON:	

NATIONAL BOARD OF ACCREDITATION

1.4. Course Outcomes and Course Articulation Matrix (30)

1.4.1. Course Outcome (Semester Wise) (15)

(Provide Course outcomes (COs) for two core courses per semester from 1-8 semesters as a sample. The maximum number of outcomes for a course is expected to be around 6. COs should reflect on the measurable outcomes towards attaining POs and PSOs).

Table No. 1.4.1.1: Course outcomes.

Semester No.:			
Course Title:		Course Code:	
Course Outcome No.	Course Outcome Statement		
CO1	**Apply** laws of physics (eg..Hook's law, etc.,) to compute different types of response (stress and deformation) in the given materials.		

Course Outcomes: Example

At the end of the course, student is able to:

1. **Apply** laws of physics (eg..Hook's law, etc.,) to compute different types of response (stress and deformation) in the given materials. (PO 1)
2. **Analyse** structural elements for different force systems to compute design parameters (BM and SF) (PO2)
3. **Conduct** experiments to validate physical behaviour of materials/components.(PO4)
4. **Prepare** laboratory reports on interpretation of experimental results (P9)

Criterion 1: Outcome-based Curriculum (120)

1.4.2. Course Articulation Matrix (15)

(Provide course articulation matrices for two core courses per semester from 1-8 semesters which have been provided in the section 1.4.1. Select courses to demonstrate the mapping/correlation with POs and PSOs.)

Table No.1.4.2: Course articulation matrix.

Course Name: ***Strength of Materials*** *Course Code:*

Course Outcomes (COs) code & Statement	Program Outcomes (POs)											Program Specific Outcomes (PSOs)	
	PO -1	PO - 2	PO - 3	PO - 4	PO - 5	PO - 6	PO - 7	PO - 8	PO - 9	PO - 10	PO - 11	PSO - 1	PSO- 2
CO - 1	**3**												
CO – 2		**2**											
CO – 3													
CO – 4				**3**									
CO - 5									**2**				
Avg	3	**2**		**3**					**2**				

Add more columns for PSOs if any

Note: ❖ Enter correlation levels 1, 2 or 3 as defined below: ❖ 1: Slight (Low), ❖ 2: Moderate (Medium) ❖ 3: Substantial (High), ❖ If there is no correlation, put “-”

Criterion 1: Outcome-based Curriculum (120)

1.5. Program Articulation Matrix (05) T

able No.1.5.1: Program articulation matrix

Course Code	Course Name	PO-1	PO -2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11
C101												
C202												
C203	Strength of Materials	3	**2**		**3**					**2**		
C 506	Design project		3	3			3					3
C4…												

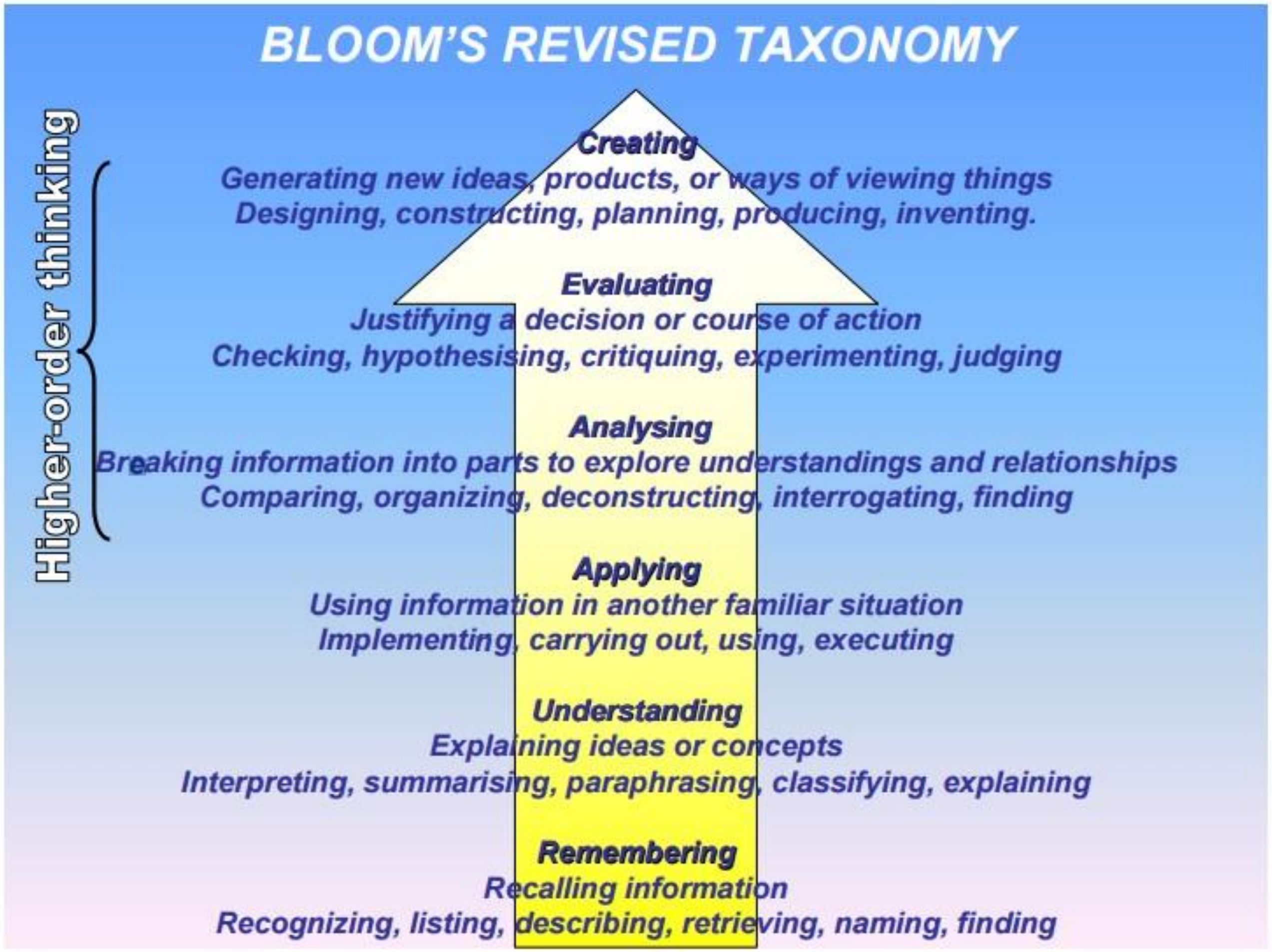
Add more columns for PSOs if any

PO	List of Courses
PO1:	Core Science Courses, CE307 Fluid Mechanics, Engineering geology, biology for engineers.,
PO2:	CE321 Structural Analysis, CE310 Hydraulic Engineering, CE490 Civil Engineering Design Project.
PO3	CE328 Foundation Engineering, CE342 Fundamentals of Reinforced Concrete, CE310 Hydraulic Engineering, CE 572 Steel design, CE490 Civil Engineering Design Project
PO6	Environmental engineering, Transoration Engineering, Hydrology and Water Resources, RCC structures, RS & GIS,
PON:	

Course Outcomes

Course Outcomes (COs)

- "Statements of observable student actions that serve as evidence of the Knowledge, Skills and Attitudes acquired in a course".
- Each course is designed to meet (about 6) Course Outcomes
- The Course Outcomes are stated in such a way that they can be actually measured.
- POs are attained through program specific Core Courses



Retrieved from: http://www.kurwongbss.qld.edu.au/thinking/Bloom/blooms.htm

Domains of Learning	Mode of Learning	Example Abilities
Cognitive Domain	*Thoughts/ Thinking*	*Memorizing, Reasoning etc.*
Affective Domain	*Emotions/ Feeling*	*Appreciation, Motivation etc.*
Psychomotor Domain	*Actions/ Doing*	*Typing, Playing etc.*

Cognitive

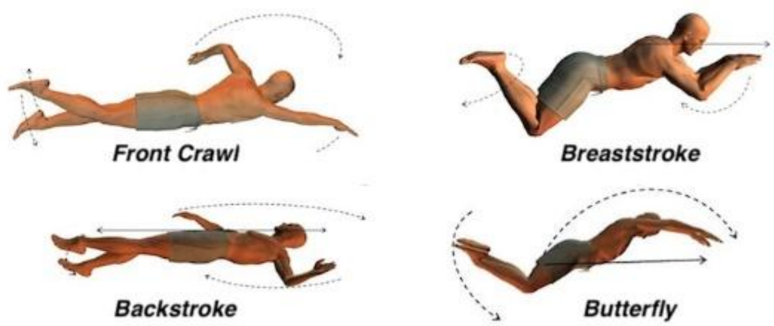
- learners' ability to process information in a meaningful way
- **Categories:**
  - Knowledge
  - Comprehension
  - Application
  - Analysis
  - Synthesis
  - Evaluation

Affective

- learners' attitudes and feelings that are a result of the learning process
- **Categories:**
  - Receiving
  - Responding
  - Valuing
  - Organizing
  - Characterizing

Psychomotor

- learners' ability to use motor skills to learn
- **Categories:**
  - Perception
  - Set
  - Guided response
  - Mechanism
  - Complex overt response
  - Adaptation
  - Origination



Course Outcomes

Engineering Physics (Not a Good Example)

CO1: Understand the knowledge of basic quantum mechanics, to set up one-dimensional Schrodinger's wave equations and its application to few physical problems.

CO2: Understand the fundamental aspects of crystallography, able to recognize various planes in a crystal and have knowledge of structure determination using x-rays.

CO3: Understand the role of free electrons in determining the properties of metals, the concept of Fermi energy, and the domain formation in ferromagnetic materials.

CO4: Understand the basic laser physics, working of lasers, holography and principle of propagation of light in optical fibers.

CO5: Understand the theory of free, damped and forced vibrations of a particle and also the concept of resonance and its applications in ESR & NMR.

What level of BLOOM,s Taxonomy you want your students to achieve?

Structure of Course Outcomes:

Course Outcome statement may be broken down into two main components:

- **An action word** that identifies the performance to be demonstrated;
- **Learning statement** that specifies what learning will be demonstrated in the performance;

Examples of good action words to include in course outcome statements:

- Compile, identify, create, plan, revise, analyze, design, select, utilize, apply, demonstrate, prepare, use, compute, discuss, predict, assess, compare, rate, critique, outline, or evaluate

Strength of Materials

SIMPLE STRESSES AND STRAINS:
Introduction, Properties of Materials, Stress, Strain, Hooke's law, St. Venant`s principle, Stress–Strain Diagram for structural steel and nonferrous materials, Principles of superposition, Deformation of uniform bars, bars of varying cross ections,taperingbarsofcircularandrectangularcrosssections.Deformationduetoself–weight.
8 Hours

ELASTIC CONSTANTS:
Relationship among elastic constants, volumetric strain, Stresses in composite sections Thermal stresses (including thermal stresses in compound bars).

TRANSFORMATION OF STRESSES: Introduction, Resolution of stresses on inclined planes, General two dimensional stress system, Principal planes and Principle stresses, Plane stress and plane strain conditions, Mohr's circle of stresses
8 Hours

BENDING MOMENT AND SHEAR FORCE IN BEAMS:
Introduction, Definitions-Bending moment and Shearing force in beam, Sign convention, Relationship between loading, shear force and bending moment, SFD and BMD with salient values for statically determinate beams(cantilever Beams, simply supported beams and overhanging beams) subjected to point loads, UDL, UVL and Couple.

BENDING STRESS IN BEAMS: Introduction – Bending stress in beam, Assumptions in simple bending theory, Pure bending derivation of Bernoulli's equation, Modulus of rupture, section modulus, flexural rigidity, Variation of bending stresses across the cross section of the beams

SHEAR STRESS IN BEAMS: Expression for horizontal shear stress in beam, Shear stress diagram for rectangular, symmetrical 'I' and 'T' section (Flitched beams not included).
12 Hours

ELASTIC STABILITY OF COLUMNS: Introduction–Short and long columns, Assumptions, Euler's theory on columns, Derivation of Euler's buckling load for a column with both ends hinged Effective length slenderness ratio, radius of gyration., Limitations of Euler's theory, Rankine's formula and problems.
12 Hours

TORSION OF CIRCULAR SHAFTS:

Pure torsion, torsion equation of circular shafts, Strength and stiffness, Torsional Rigidity and polar modulus, Power transmitted by shaft of solid and hollow circular sections.
THIN AND THICK CYLINDERS: Stresses in thin cylinder subjected to pressure, hoop, longitudinal and volumetric strains, Thick cylinders-Lame's equations, radial and hoop stresses (excluding compound cylinders).

Course outcomes: After studying this course, students will be able;

1. To evaluate the strength of various structural elements internal forces such as compression, tension, shear, bending and torsion.
2. To suggest suitable material from among the available in the field of construction and manufacturing.
3. To evaluate the behavior and strength of structural elements under the action of compound stresses and thus understand failure concepts
4. To understand the basic concept of analysis and design of members subjected to torsion.
5. To understand the basic concept of analysis and design of structural elements such as columns and struts.

- **Which POs are targeted ??**
- **Do we want to do all of them ?**
- **How many POs this course can give ?**

Course Title: Strength of Materials

Course Outcomes: Example

Action Verb

At the end of the course, student is able to:

1. **Apply** laws of physics (eg..Hook's law, etc.,) to compute different types of response (stress and deformation) in the given materials. (PO 1)

Learning Statement

2. **Analyse** structural elements for different force systems to compute design parameters (BM and SF) (PO2)
3. **Conduct** experiments to validate physical behaviour of materials/components.(PO4)
4. **Prepare** laboratory reports on interpretation of experimental results (P10)

CO-PO Relationship

- Each CO can be identified to address a subset of POs
- Based on the intended measurement of COs and the evidence of learning to be obtained, it is possible to identify the strength of mapping (1, 2 or 3) to POs
- Based on these strengths of selected POs a CO–PO matrix can be established

Constructive Alignment

- How do we arrive at mapping based on constructive alignment ?
- Correlation depends on relevance.
- Strength of correlation depends on constructive alignment of the assessment.

- We will see an Example…

Alignment of Assessment to COs and hence to POs…Example.

Topic: Mix Proportioning

Mix proportioning is a process of arriving at suitable proportions of concrete ingredients based on their characteristics to achieve desired strength and durability characteristics of concrete. Here, students will have the freedom of selecting different types of cements, aggregates, admixtures to arrive at a given grade of concrete say M40.

Contd.,

- To introduce complexity, students can be asked to provide solutions for the same M40 grade concrete but to be used in different field conditions such as Hot weather concreting, Underwater concreting, Mass concreting, High early strength requirement in say 3 days.

PO1: **Engineering Knowledge**: ***Apply*** ***the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems***

Example Situation 1: **CO3: Able to understand mix proportioning techniques for field applications.**	
Assessment for CO3: (Question in Tests) **Briefly explain the various methods of mix proportioning techniques.**	
• ***Does this CO reflects the intended measurement from PO1?*** • ***Does the assessment correlates well with the CO?***	Mapping: CO3- PO1.

- ***In this case, CO does not reflect the intention of measuring <u>application of either science, maths or engineering principles</u>. It can measure only remembrance in this topic.***
- ***Further, the assessment, does not test the requirement of application of engineering principles used in mix proportioning as per PO1. Hence, the correlation between CO-PO is weak.***

PO2:Problem Analysis: *Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences*

Example Situation 2:

CO3: Able to <u>apply</u> mix proportion principles to design a concrete mix for field applications.

Assessment for CO3: (Question in Tests)

Proportion a concrete mix for M40 grade concrete by IS method. Given data: maximum nominal size of aggregate: 20mm; minimum cement content: 340kg/cum; maximum w/c ratio: 0.45; workability: 75mm slump; exposure: very severe; concreting type: pumping mode; quality at site: good; aggregate type: sub-angular; sp. gr of cement – 3.15, aggregate – 2.68, flyash – 2.08, SP 1.08, Design using IS 10026 – 2009.

• ***Is CO reflects the intended measurement from PO2?*** • ***Does the assessment correlates well with the CO?***	Mapping: CO3 - PO2

In this case, the assessment does not test the students ability to identify, formulate and do some research for arriving at a suitable concrete mix for a given situation since many variables of the design have already been identified in the problem and hence the strength of mapping of CO3 for PO2 in the above example can not be considered good. At best it can map well for PO1 as it involves application of engineering fundamentals.

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.**

Example Situation 3: **CO3: Design concrete mix for field applications using characteristics of mix constituents and relevant IS codes.**
Assessment:/ASIGNMENT/ *ABC Construction Company is entrusted with manufacturing of precast elements for elevated express way. The precast elements are required to attain 40 MPa in 7 days. Design a mix for least cost. The mix should comply with the requirements of IS 10262 and IS 456.*

• ***Is CO reflects the intended measurement from PO3 ?*** • ***Does the assessment correlates well with the CO?***	Remarks: CO3 –PO3

In this case, students are expected design mix using various parameters such as type of cement which can be used for early strength gain, water content (W/C), workability required to manufacture such precast elements. They are also required to look for specifications as per the codal provisions and then apply engineering principles to arrive at mix proportions for a least cost.

The assessment correlates well with the CO and hence maps strongly PO3.

COs (Summary)

Example Situation 1:

- **Able to understand mix proportioning techniques for field applications.**

Example Situation 2:

- **Able to <u>apply</u> mix proportion principles to <u>proportion</u> a concrete mix for field applications.**

Example Situation 3:

- **Design concrete mix for field applications using characteristics of mix constituents and relevant IS codes.**

(Choice of writing an appropriate CO and choosing the right assessment to map corresponding PO remains with the course instructor)

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Table 3.3 COURSE OUTCOMES OF ME6503-Design of Machine Elements

ME6503	ME6503- Design of Machine Elements	K-Level
ME6503.1	Students will **understand** various steps involved in the Design Process, principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.	Understand
ME6503.2	Students will be able to **apply** the concepts for design of shafts and couplings using standard practices and standard data	Apply
ME6503.3	Students will **apply** standard practices and standard data while designing temporary and permanent fasteners.	Apply
ME6503.4	Students will **apply** standard practices and standard data while designing energy storing elements and familiarize with usage of catalogues and standard machine components.	Apply
ME6503.5	Students will **apply** standard practices and standard data and to use catalogues while designing bearings.	Apply
ME6503.6	Students can able to successfully design and analyze machine components.	Apply

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Course Name : ME6503-Design of Machine Elements

Communication

Table 3.9 CO PO MATRIX OF ME6503-Design of Machine Elements

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
ME6503.1	3	3	2	2	2	3	2	2	2	3	2
ME6503.2	3	3	2	2	2	3	2	2	2	3	2
ME6503.3	3	3	2	2	2	3	2	2	2	3	2
ME6503.4	3	3	2	2	2	3	2	2	2	3	2
ME6503.5	3	3	2	2	2	3	2	2	2	3	2
ME6503.6	3	3	3	2	2	3	2	2	2	3	2
ME6503	**3**	**3**	**2.16**	**2**	**2**	**3**	**2**	**2**	**2**	**3**	**2**

CO-PO mapping ??

available as evidence, if asked) (05)

Course Name: LOGIC DESIGN - 2015	Year of Study: 2
C203.1	Apply the fundamental concepts of binary logic.
C203.2	Formulate the techniques to design an optimal logic circuit.
C203.3	Analyze combinational circuits and their application as logic design components in digital systems.
C203.4	Design combinational circuits to perform specific digital functions.
C203.5	Analyze sequential circuits and design sequential applications for digital systems.
C203.6	Design, analyze and demonstrate a micro digital system.

Course Name: LINEAR IC's & ITS APPLICATIONS Year of Study

Course Name: LOGIC DESIGN - 2015 Year of

Apply

Design

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1
C203.1	3	3	3	2	-	-	-	-	-	-	-	-	-
C203.2	3	3	3	1	-	-	-	-	-	-	-	-	-
C203.3	3	3	3	1	-	-	-	-	-	-	-	-	-
C203.4	3	3	2	1	-	-	-	-	-	-	-	-	-
C203.5	3	3	2	1	-	-	-	-	-	-	-	-	-
C203.6	3	2	1	1	-	-	-	-	-	-	-	-	-
C203	3	3	3	1	-	-	-	-	-	-	-	-	-

Course	Design of Steel Structural Elements & Software Applications Lab	Course Code	20CV6PCDSS	SEE Duration	3 Hours
Credits	04	L:T:P	2:1:1	Theory + LAB CIE	25 + 25 M
Contact Hours	36 Hrs	Lab Contact Hours	2 Hrs / week	CIE + SEE	50 + 50 M

COURSE OBJECTIVES:
To teach the students, the method of design of various steel structural members and their connections.

COURSE OUTCOMES: An ability to

CO1: Understand steel structures and limit state design.
CO2: Analyze and design structural steel bolted and welded joints.
CO3: Analyze and design structural steel members subjected to tension, compression and bending.
CO4: Utilize commercial software packages to simulate practical problems.
CO5: Ability to develop computational code by using MATLAB.

CO-PO MAPPING SCALE 1 TO 3

COURSE : Design of Steel Structures and Software application Laboratory												CODE: 20CV6DCDSS			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	3
CO2	3	1	-	-	-	-	-	-	-	-	-	-	-	-	3
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3
CO4	3	-	-	2	-	-	-	-	-	-	-	-	-	-	3
CO5	-	-	1	-	3	-	-	-	-	-	-	2	-	-	3

COURSE: Design of Steel Structures and Software application Laboratory					
Taxonomy levels and COs	Remember/ understand	Apply	Analyze	Design	Create or any other
CO1	✓	✓			
CO2	✓	✓			
CO3	✓	✓	✓		
CO4	✓	✓	✓		
CO5		✓	✓	✓	

Course outcomes:

At the end of the course on **VLSI Design**, the student will have the

CO1	Ability to **define, understand** and **explain** concepts of nMOS and CMOS technology.	--	PSO3(2)
CO2	Ability to **apply** the knowledge of VLSI to fabricate the MOS circuits, **illustrate** different CMOS logic structures, subsystems and memory elements, **calculate** rise time and fall time estimations.	PO1(3)	PSO3(2)
CO3	Ability to **analyze** the monochrome layout and stick diagrams of MOS technology and CMOS logic structures and subsystems, **deduce** appropriate testability vectors for the given parameters.	PO2(3)	PSO3(2)
CO4	Ability to **conduct experiments** using VLSI tools for a given application/problem statement.	PO1(2) PO5(2)	PSO3(2)
CO5	Ability to **analyze the given** VLSI simulation block and arrive at the application/problem statement.	PO2(2) PO5(2)	PSO3(2)
CO6	Ability to implement a **mini-project** to develop the specified application using VLSI tools	PO3 (2) PO5 (2)	PSO3(2)

CO-PO Relationship

COURSE	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
Analysis of structures II	CO1	3	3	-	-	-	-	-	-	-	-	-
	CO2	3	3	-	-	-	-	-	-	-	-	-
Environmental Engineering I	CO1	3	2	-	3	-	3	3	-	-	-	-
	CO2	3	3	-	-	-	3	3	-	-	3	-
	CO3	-	-	3	-	-	-	3	3	-	3	-
Geotechnical Engineering II	CO1	3	3	-	-	-	-	-	-	-	-	-
	CO2	3	3	-	-	-	-	-	-	-	-	-
	CO3	3	3	-	-	-	-	-	-	-	-	-
	CO4	3	3	2	-	-	3	-	-	-	-	-
Concrete Technology	CO1	3	-	-	-	-	-	-	-	-	-	-
	CO2	-	3	3	-	-	-	-	-	-	-	-
	CO3	-	3	3	-	-	-	-	-	-	-	-
	CO4	-	-	-	-	-	-	-	3	3	-	-
Hydrology and water resources	CO1	3	3	-	-	-	-	-	-	-	-	-
	CO2	3	3	-	-	-	-	-	-	-	-	-
	CO3	3	3	3	-	-	-	-	3	-	-	-
Quantity Surveying and Costing	CO1	3	3	-	1	-	-	-	-	-	-	-
	CO2	3	3	-	-	2	2	-	-	-	-	-
	CO3	3	3	-	-	-	-	-	-	-	-	-
	CO4	2	3	2	-	-	3	-	-	-	-	-
Alternate Building Material & Technology	CO1	3	-	-	-	-	-	3		-	-	-
	CO2		3	-		-	-	3		-	-	-
	CO3		-	-	-		-	3		-	-	-
	CO4			3	-	2	-	2	3	-	-	-
Major Project Phase II	CO1	-	-	-	-	-	-	3	-	3	-	-
	CO2	3	3	3	3	-	-	-	3	3	-	-
	CO3	-	-	-	-	3	-	-	-	3	-	-
	CO4									[illegible]	[illegible]	[illegible]

Criterion 2: Outcome-Based Teaching Learning (120)

2.1. Describe Processes Followed to Ensure Quality of Teaching & Learning (20)

(Processes may include adherence to academic calendar and instruction methods using pedagogical initiatives such as real-world examples, collaborative learning, quality of laboratory experience with regard to conducting experiments, recording observations, analysis of data etc. encouraging fast learners, assisting slow learners etc. The implementation details and impact analysis need to be documented.)

Exhibits/Context to be Observed/Assessed:

A. Academic Calendar and its effective implementation.
B. Documentary evidence of supporting the implementation of pedagogical initiatives, such as real-life examples, collaborative learning, ICT-supported learning, and interactive classrooms.
C. Documentary evidence of tailored resources, differentiated instruction, and individualized attention to meet their unique learning needs
D. Classroom ambience and efforts to keep students engaged (also to be verified during interaction with the students).
E. Quality of laboratory experience concerning conducting experiments, recording observations, analysis, etc. (also to be verified during interaction with the students).

Criterion 2: Outcome-Based Teaching Learning (120)

2.2. Quality of Student Capstone Project (25)

(Quality of the capstone/major project is measured in terms of consideration to factors including, but not limited to, environment, sustainability, safety, ethics, cost, type (application, product, research, review etc.) and standards. Processes related to project identification, allotment, continuous monitoring, evaluation including demonstration of working prototypes and enhancing the relevance of projects. Mention implementation details including details of POs and PSOs addressed through the projects with justification.)

Exhibits/Context to be Observed/Assessed:

A. Capstone/major project identification and guide/ supervisor allocation process
B. Projects classification (application, product, research, review, etc.), incorporating factors such as environment, safety, ethics, cost, standards, and mapping with POs and PSOs.
C. Process for continuous monitoring (Meeting records with guide and its frequency etc.,)
D. Quality of projects, working models, or prototypes incorporating factors such as environment, safety, ethics, cost, standards, and mapping with POs and PSOs.

Criterion 2: Outcome-Based Teaching Learning (120)

2.3. Internship/Industrial Training (10)

(Describe process, duration, POs/PSOs addressed.)

2.4. Seminar and Mini/Micro Projects (10)

(Describe process, POs/PSOs addressed.)

2.5. Case Studies and Real-Life Examples (10)

(Type and complexity, POs/PSOs addressed.)

2.6. SWAYAM/NPTEL/MOOC/Self Learning (10)

(Number of students registered, certification and POs/PSOs addressed.)

A. Documentary evidence of process of internship/ industrial training for students, number of students participated, relevant training areas, documented visit report, with a duration of not less than 2 weeks for the industrial training/internship.
B. Documentary evidence of mapping of internship and training programs for students to POs and PSOs
C. Documentary evidence of student feedback on industrial training and its analysis and actions taken.

Rubrics for measurement

Criterion 2: Outcome-Based Teaching Learning (120)

2.7. Solving Complex Engineering Problems Incorporating Sustainability Goals (20)

*(Provide details of **core courses** (Project based learning, problem-based learning), mini projects, integrated design projects, capstone projects, hackathon or any other activity-based learning **towards solving complex engineering problems targeting relevant SDGs.)***

- *(*Documentary evidences of solving complex engineering problems targeting SDGs)

2.8. Steps Taken for Enhancing Industry Institute Partnerships (15)

(Provide details of partial delivery of courses, industry supported labs, industry offered short-term programs/training etc.)

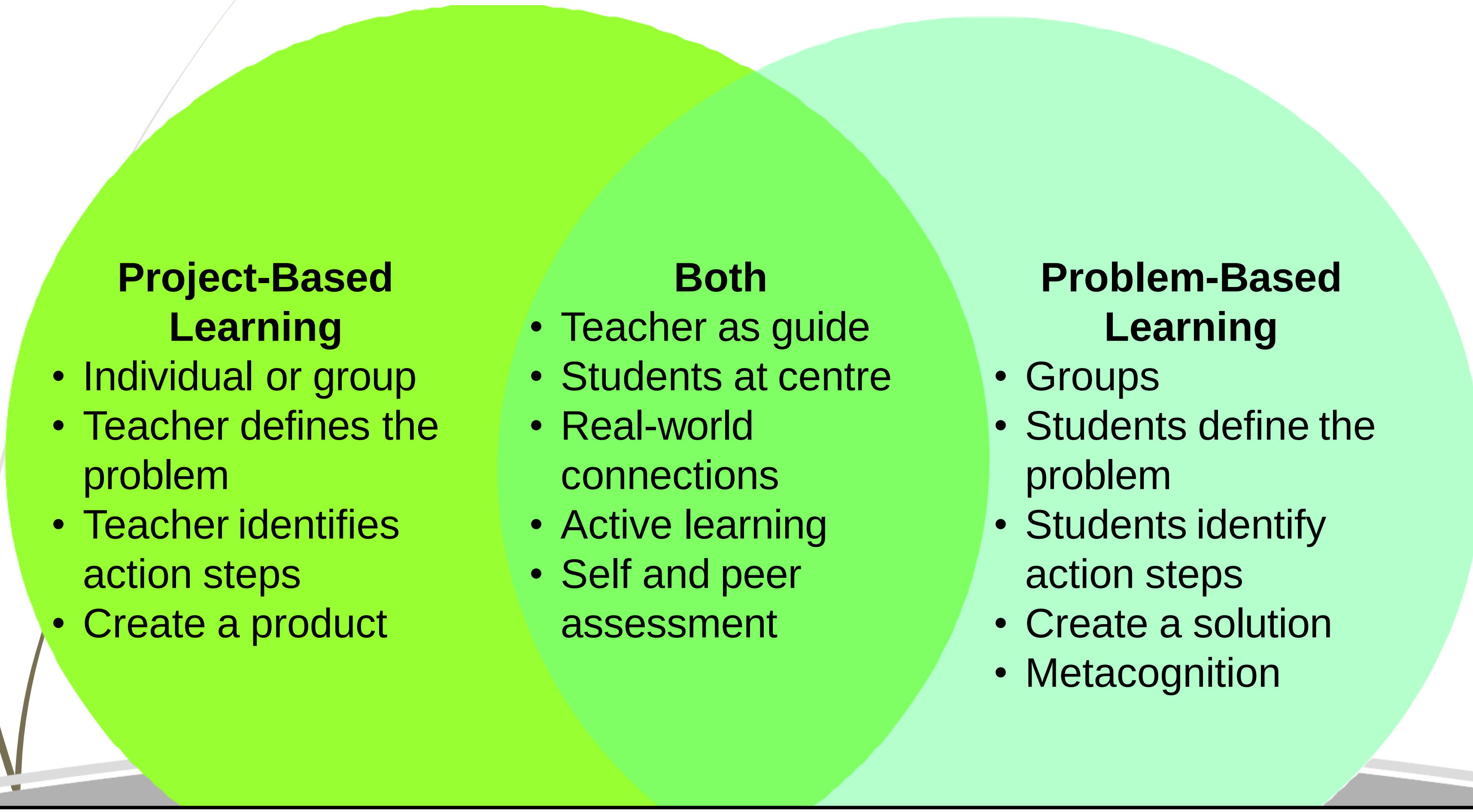
A. Documentary evidence of industry involvement in the partial delivery of any regular courses.
B. Documentary evidence of industry offered courses/training
C. Types of industries, types of labs, objectives, utilization, and effectiveness.
D. Analysis and actions taken as a result.

2.7. Solving Complex Engineering Problems Incorporating Sustainability Goals (20)

(***Provide details of core courses (Project based learning, problem-based learning), mini projects, integrated design projects, capstone projects, hackathon or any other activity-based learning towards solving complex engineering problems targeting relevant SDGs.)***

Problem-Based Learning

What's the Difference?



Bottom Line: **In Problem-Based Learning, students have more control over their own learning and the processes involved.**

Advantages of Problem Based Learning

- Can be incorporated in any course
- Learner-centred
- Students acquire content knowledge, skills and attitudes
- Facilitates measurement of skill based Programme Out comes namely, Team work, Communication, Life long learning…

Sample Problem

XYZ Construction Company has been in the forefront of concrete construction in India. It specializes in construction of Infrastructure and Buildings. The company wants to hire construction engineers who can take proactive role in the future projects of the company and build their career along with the company.

Following are the requirements of the concrete engineer who will be responsible for the *sourcing of materials, quality control of materials, proportioning of concrete mixes using locally available materials for different applications, evaluation of its properties (fresh, hardened and durability) pertaining to appropriate codes.*

Expected Out Comes

- **The candidate should be well versed with the current trends of materials innovation, quality assurance practices, concrete production and testing methods and standards. Further, candidate is required to apply/demonstrate skills for communication, social concern and capacity to learn independently and reflect and implement new concreting requirement for the projects.**

PBL - Example

- **Problem:**

Development of Pervious concrete for pavements

4 Common Range and Contextual Definitions

Range of Problem Identification and Solving

References included are to the Knowledge and Attitude Profile i

In the context of both Graduate Attributes and Professional Comp

Attribute	*Complex Engineering Problems* have characteristic WP1 and some or all of WP2 to WP7:
Depth of Knowledge Required	**WP1:** Cannot be resolved without in-depth engineering knowledge at the level of one or more of WK3, WK4, WK5, WK6 or WK8 which allows a fundamentals-based, first principles analytical approach
Range of conflicting requirements	**WP2:** Involve wide-ranging and/or conflicting technical, non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements
Depth of analysis required	**WP3:** Have no obvious solution and require abstract thinking, creativity and originality in analysis to formulate suitable models
Familiarity of issues	**WP4:** Involve infrequently encountered issues or novel problems
Extent of applicable codes	**WP5:** Address problems not encompassed by standards and codes of practice for professional engineering
Extent of stakeholder involvement and conflicting requirements	**WP6:** Involve collaboration across engineering disciplines, other fields, and/or diverse groups of stakeholders with widely varying needs
Interdependence	**WP 7:** Address high level problems with many components or sub-problems that

WP1 and WP5

SDG 11

WK 3, WK4, WK5 WK6 and WK8

POs ??

PO1, PO2 , PO4, PO6, PO11

Assessment strategy

Rubric for Evaluating Self Study

Course: - Advances in Construction Materials

Problem – Develop a concrete mix for field applications

Batch No: **Title :**

Performance Indicators ↓	Unsatisfactory (2)	Developing (6)	Satisfactory (8)	Exemplary (10)	Score
Identifying Problem & Materials characteristics for possible solutions (PO1)					
Choice of complexities of field requirement and identification of material characteristics				Identified problem is complex and relevant to field application. All the characterization of material is carried out.	
Research Analysis & Mix proportioning (PO2)					
Identifying research gaps and Proportioning of mixes using new methods (PO2)					
Design of experiments (PO4)					
Choice of Experiments to arrive at solutions. (PO4)					
Communication and Life long learning (PO9, PO11)					
Presentation and Reporting of work (PO9, PO11)					
				Total Score(Maximum, 40)	

PO2 : PBL, Can it help?

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

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

Complex Engineering Problems. (Definition)

4 Common Range and Contextual Definitions

Range of Problem Identification and Solving

References included are to the Knowledge and Attitude Profile i

In the context of both Graduate Attributes and Professional Comp	
Attribute	***Complex Engineering Problems*** have characteristic WP1 and some or all of WP2 to WP7:
Depth of Knowledge Required	**WP1:** Cannot be resolved without in-depth engineering knowledge at the level of one or more of WK3, WK4, WK5, WK6 or WK8 which allows a fundamentals-based, first principles analytical approach
Range of conflicting requirements	**WP2:** Involve wide-ranging and/or conflicting technical, non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements
Depth of analysis required	**WP3:** Have no obvious solution and require abstract thinking, creativity and originality in analysis to formulate suitable models
Familiarity of issues	**WP4:** Involve infrequently encountered issues or novel problems
Extent of applicable codes	**WP5:** Address problems not encompassed by standards and codes of practice for professional engineering
Extent of stakeholder involvement and conflicting requirements	**WP6:** Involve collaboration across engineering disciplines, other fields, and/or diverse groups of stakeholders with widely varying needs
Interdependence	**WP 7:** Address high level problems with many components or sub-problems that

may require a system approach.

Annexure I: Knowledge and Attitude Profile (WK)

- WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
- WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
- WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
- WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
- WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
- WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
- WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.
- WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.
- WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

Problem statement

Agricultural byproducts are a sustainable and easily accessible material. Biochar production from such waste is an eco-friendly method that follows the rules of the circular economy and conserves resources. Biochar may be made from agricultural byproducts such as rice husks, maize cobs, and coconut shells. This helps with waste management by lowering the amount of agricultural wastes that would otherwise be burnt or allowed to degrade, which might lead to pollution. A biochar water filter solves two environmental problems: agricultural waste management and clean drinking water. This initiative decreases pollution, promotes sustainable resource use, and improves water availability by turning agricultural leftovers into filter media. The initiative promotes sustainable development and public health via environmental engineering, sustainability, and community participation.

Design and Testing of a Biochar Water Filter

Description: Develop an environmentally friendly water filter that uses biochar, made from agricultural waste, to remove harmful contaminants from drinking water.

Scope of the Project

Create a Biochar Water Filter:

Make a water filtration system using biochar from agricultural waste to eliminate pollutants.

Encourage Sustainable Waste Management:

Show that agricultural wastes may be used to make biochar, minimizing waste and pollution.

Improve Clean Water Access: Improve rural and underserved water quality at low cost and sustainability.

Reference: Dr. Prathima, CV, BMSCE.

Justification as complex engineering problem and its mapping to WK's

WP	Justification	Targeted WK's		
		WK1	WK5	WK7
WP1 – Depth of Knowledge required	Requires in-depth knowledge of chemical engineering (pyrolysis and adsorption), environmental science (contaminant behavior), and materials science (properties of biochar).	The project requires an understanding of chemistry (e.g., chemical reactions involved in pyrolysis), and environmental science (e.g., contaminant behavior and environmental impact).	• Efficient resource reuse • Pollution reduction • Water quality improvement • Sustainable practices • Circular economy principles	The project addresses ethical considerations in providing clean water, managing agricultural waste, and ensuring environmental sustainability. It emphasizes the professional responsibility of engineers to protect public health and the environment.
WP2 – Range of conflicting requirements	Conflicts arise in balancing the efficiency of contaminant removal, the sustainability of biochar production, and the economic feasibility of the solution.			

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

Rubrics (Indicative Example)

WK	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
PO1	Comprehensive understanding and application of chemistry, and environmental science.	Strong grasp with minor gaps.	Basic understanding with some application struggles.	Insufficient understanding of natural science concepts.
PO2	Optimisation of resource use, Analysis of environmental impacts, whole-life cost, and re-use concepts,.	Strong application with minor gaps.	Basic understanding with application struggles.	Insufficient understanding of key concepts.
PO6	Comprehensive understanding of societal role, ethics, and sustainability.	Strong awareness with minor gaps.	Basic understanding with lack of depth.	Insufficient understanding of societal role and ethics.

Criterion 3: Outcome-Based Assessment (120)

3.1. Evaluation of Continuous Assessment: Assignments, Unit Tests, Mid-Term, etc. (10)

(Describe the process of evaluation followed during continuous assessment to maintain quality of assessment; constructive alignment of questions with COs and hence POs/ PSOs. Details to be kept in course files for evaluation.)

A. Process for setting internal semester question papers, creating model answers, evaluating them, and ensuring compliance.
B. Assessment of the quality of unit tests/class tests/mid-term tests/assignments
C. Documentary evidence of mapping questions with COs.
D. Evidence of sharing of post evaluation feedback with students for performance improvement

3.2. Evaluation of the Semester End Exam (SEE) Question Paper (10)

(Describe the process of setting of SEE papers & their evaluation to maintain quality of assessment, constructive alignment of questions with COs and POs/PSOs. Details to be kept in course files for evaluation.)

A. Process for setting semester-end exam question paper evaluating and ensuring compliance.
B. Assessment of the quality of semester end exam question paper
C. Evidence of transparency of post evaluation process

Criterion 3: Outcome-Based Assessment (120)

3.3. Evaluation of Laboratory Work and Workshop (Continuous and SEE) (10)

(Provide details of rubrics used to assess learnings in laboratories and workshops linking with COs and POs/PSOs targeted. Evidence of student assessments through rubrics to be kept in course files for evaluation.)

(Evidence of Rubrics developed and used for assessing student performance during workshops/laboratories.)

3.4. Evaluation of Industrial Training/Internship (Continuous and SEE) (10)

(Provide details of rubrics used to assess learnings in internships/industrial trainings linking POs/PSOs targeted for attainment. Evidence of student assessments through rubrics to be kept in course files for evaluation.)

(Evidence of Rubrics developed and used for assessing student performance during workshops/laboratories.)

Criterion 3: Outcome-Based Assessment (120)

3.5. Evaluation of Projects (20)

(Provide details of rubrics used to assess learnings in projects linking POs/PSOs targeted for attainment. Evidence of student assessments through rubrics to be kept in course files for evaluation.)

(Rubrics used for assessing complexity, cost, relevance to the environment, and sustainability (10)

Rubrics used for assessing team work, communication, and use of project management concepts (10))

3.6. Evidence of Addressing Sustainable Development Goals (SDG) (10)

(Provide details of student work carried out to meet sustainable development goals such as research work, project work, student activities etc. Evidence in the form of a portfolio to be made available during the visit.)

(Student Portfolio's)

Criterion 3: Outcome-Based Assessment (120)

3.7. Attainment of Course Outcomes (25)

3.7.1. Describe the Assessment Tools and Processes Used to Gather the Data for the Evaluation of Course Outcome (05)

(Describe different assessment tools (semester end examinations, mid-semester tests, laboratory examinations, student portfolios etc.,) to measure the student learning and hence attainment of course outcomes.)

3.7.2. Record the Attainment of Course Outcomes of all Courses with Respect to Set Attainment Levels (20)

(Program shall set course outcome attainment levels for each course. Measuring CO attainment through Continuous Internal Examinations (CIE) and Semester End Examination (SEE) needs to be detailed.

Target may be stated in terms of percentage of students getting more than class average marks or set by the program in each of the associated COs in the assessment instruments (midterm tests, assignments, mini projects, reports and presentations etc. as mapped with the COs.))

3.8. Attainment of Program Outcomes and Program Specific Outcomes (25)

(The attainment of POs and PSOs by direct assessment based on student performance and indirect assessment based on surveys are to be presented through program level Course-PO&PSO matrices as indicated.)

Criterion 3: Outcome-Based Assessment (120)

PO and PSO Attainment:

Table No.3.8.1: PO and PSO attainment value using direct assessment tools.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C101											
C102											
…….											
C409											
Direct Attainment											

Add more columns as needed for PSOs if any.

Note:

- C101, C102 are indicative courses in the first year. Similarly, C409 is final year course. First numeric digit indicates year of study and remaining two digits indicate course nos. in the respective year of study.
- Direct attainment of a PO/PSO is determined by taking average across all courses addressing that PO/PSO.

Criterion 3: Outcome-Based Assessment (120)

Table No. 3.8.2: PO and PSO attainment value using indirect assessment tools.

Name of the Survey	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
Survey-1											
Survey-2											
Survey-3											
……..											
Indirect Attainment											

Add more columns as needed for PSOs if any.

Note:

- Mention the type of survey conducted and the location of its source.
- Indirect attainment level of a PO/PSO is determined based on the student exit surveys, employer surveys, etc.

Criterion 3: Outcome-Based Assessment (120)

Table No. 3.8.3: Overall PO and PSO attainment value.

Assessment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
Direct Attainment											
Indirect Attainment											
Overall Attainment											

Add more columns as needed for PSOs if any.

Example of CO-attainment for a course

Course Name :	Concrete Technology
Course Code :	CV 41
Session of Course	Batch-2013, Sep-Dec'2013
L : T : P -	
Semester :	I
Credits :	4
Batch :	2013
Faculty :	R V Ranganath

50%

70%

Grading Scale	
SCORE : < 50%	1
50% - < 70%	2
> =70%	3

75%	**Percent of Students should score > 70% of marks for Attainment**

CO	CO Decription	T1	T2	A1	A2		LAB
CO1	**Identify** constituent of concrete material characteristics and different types of concrete for their appropriate use in construction. [K 2](PO1)	Q1.a, b, Q2 a,b		-	-	-	-
CO2	**Compare behaviour of concrete properties with known materials for design applications**(PO2, PO3)			A1	-	-	-
CO3	**Analyse characteristics of mix constituents and *design* a concrete mix for field applications.** { PO2, PO3)		Q1, Q2	-	A2 -	-	
CO4	**Prepare** a comprehensive report on new knowledge in any one of the topic related to concrete technology [K5] (PO8, PO9)			-		-	lab-

Example of CO-attainment for a course

	Program Outcomes	PO1																				
	Max Marks	**10**	**10**	**10**	**10**				40					**5**				5				
	Course Outcomes	**CO1**							TOTAL OBTAINED	TOTAL MARKS ATTEMPTED	PERCENT, %	SCORES OR GRADING BASED ON SCALE OF 3	Target>=70%	CO2				TOTAL OBTAINED	TOTAL MARKS ATTEMPTED	PERCENT, %	SCORES OR GRADING BASED ON SCALE OF 3	Target>=70%
USN	**Name**	T1-Q1.a	T1-Q1.b	T1-Q2.a	T1-Q2.b									**Assignment-1**								
1BM13CCT01	ANUSHA S. B.	8	7	8					23	30	77%	3	Y	3				3	5	60.00%	2	
1BM13CCT02	BHAVISH DAS (discontinued after I sem)	5	6	12	8				31	40	78%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT03	DEEPA M NAIK			8	7				15	20	75%	3	Y	5				5	5	100.00 %	3	Y
1BM13CCT04	GOLLAPALLI NIRANJAN REDDY			9	7				16	20	80%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT05	JHANSI RAMA PRIYA			9	9				18	20	90%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT06	NIRANJANA N	7	6	9	3				25	40	63%	2		4				4	5	80.00%	3	Y
1BM13CCT07	PAVAN J.			9	9				18	20	90%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT08	PRAMOD B. V.			10	9				19	20	95%	3	Y	3				3	5	60.00%	2	
1BM13CCT09	PRAVEEN GONGACHI	4	7						11	20	55%	2		4				4	5	80.00%	3	Y
1BM13CCT10	RAJESH A.			9	7				16	20	80%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT11	SALMAN PASHA	7	7	6					20	30	67%	2		4				4	5	80.00%	3	Y
1BM13CCT12	SHARATH R.	7	7	8	8				30	40	75%	3	Y	3				3	5	60.00%	2	
1BM13CCT13	SHRINATH			9	8				17	20	85%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT14	SOWMYA H. V.			9	7				16	20	80%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT15	SUNIL KUMAR B. M.		2	7	7				16	30	53%	2		3				3	5	60.00%	2	
1BM13CCT16	VIKAS PRABHAKAR ATTIGERI			9	8				17	20	85%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT17	VIKRAM C GATEGAR			7	8				15	20	75%	3	Y	4				4	5	80.00%	3	Y
1BM13CCT18	VILASKUMAR S. LONIMATH			8	8				16	20	80%	3	Y	5				5	5	100.00 %	3	Y
											SUM	50	14							SUM	50	14
										AVG GRADING		2.78							AVG GRADING		2.78	

Example of CO-attainment for a course

10	10	10	10				40		PERCENT, %	SCORES OR GRADING BASED ON SCALE OF 3	Target > =70%
CO3							TOTAL OBTAINED	TOTAL MARKS ATTEMPTED			
T1-Q3.a	T1-Q3.b	T2-Q2.a	T2-Q2.b								
8	7						15	20	75.00%	3	Y
		5	12				17	20	85.00%	3	Y
6	8	8	5				27	40	67.50%	2	
	9						9	10	90.00%	3	Y
9	9						18	20	90.00%	3	Y
-	-	-	-				0	40	0.00%	1	
-	-	-	-				0	40	0.00%	1	
8	8						16	20	80.00%	3	Y
8	8						16	20	80.00%	3	Y
6	8						14	20	70.00%	3	Y
		7	7				14	20	70.00%	3	Y
-	-	-	-				0	40	0.00%	1	
8	9	8	7				32	40	80.00%	3	Y
9	9						18	20	90.00%	3	Y
5	6						11	20	55.00%	2	
9	8	8	8				33	40	82.50%	3	Y
7	8	8					23	30	76.67%	3	Y
8	9						17	20	85.00%	3	Y
									SUM	46	13
								AVG GRADING		2.56	

Example of CO-attainment for a course

COURSE OUTCOMES	GRADING AVG ON SCALE OF 3	DISTRIBUTION %		
		3	2	1
CO1	**2.78**	14 / 18 = 77.77%	4 / 18 = 22.22%	0 / 18 = 0%
CO2	**2.78**	14 / 18 = 77.77%	4 / 18 = 22.22%	0 / 18 = 0%
CO3	**2.56**	13 / 18 = 72.22%	2 / 18 = 11.11%	3 / 18 = 16.66%
CO4	**2.56**	10 / 18 = 55.55%	8 / 18 = 44.44%	0 / 18 = 0%

TARGET is > = More than 75% of Students Must Achieve 70% Marks.

PO AND CO SCALE		
	3	**Strongly Related**
	2	**Moderate**
	1	**Low**

NUMBER OF STUDENTS SCORING > =70%

COURSE OUTCOMES	% OF STUDENTS ACHIEVED CO	CO RESULT
CO1	77.78%	Y
CO2	77.78%	Y
CO3	72.22%	N
CO4	55.56%	N

Attainment of Pos:

Course Name	COs	CO Attainment , %	CO Result	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Analysis of Structures-II	CO1	86.00%	YES	86%	86%	-	-	-	-	-	-	-	-	-	-
	CO2	78.00%	YES	78%	78%	-	-	-	-	-	-	-	-	-	-
Environmental Engineering-I	CO1	85.96%	YES	86%	57%	-	86%	-	86%	86%	-	-	-	-	-
	CO2	77.19%	YES	77%	77%	-	-	-	77%	77%	-	-	77%	-	-
	CO3	91.23%	YES	-	-	91%	-	-	-	91%	91%	-	91%	-	-
Geotechnical Engineering-II	CO1	70.00%	NO	-	-	-	-	-	-	-	-	-	-	-	-
	CO2	74.00%	NO	-	-	-	-	-	-	-	-	-	-	-	-
	CO3	100.00%	YES	100%	100%	-	-	-	-	-	-	-	-	-	-
	CO4	75.00%	YES	75%	75%	50%	-	-	75%	-	-	-	-	-	-
Concrete Technology	CO1	77.78%	YES	77.78%	-	-	-	-	-	-	-	-	-	-	-
	CO2	77.78%	YES	-	77.78%	77.78%	-	-	-	-	-	-	-	-	-
	CO3	72.22%	NO	-	-		-	-	-	-	-	-	-	-	-
	CO4	55.56%	NO	-	-	-	-	-	-	-	-	-	-	-	-
Hydrology & Water Resources	CO1	83.00%	YES	83%	83%	-	-	-	-	-	-	-	-	-	-
	CO2	78.00%	YES	78%	78%	-	-	-	-	-	-	-	-	-	-
	CO3	68.00%	NO	-	-	-	-	-	-	-	-	-	-	-	-

Contd...

Course Name	COs	CO Attainment, %	CO Result	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Quantity Surveying and Costing	CO1	95.00%	YES	95%	95%	-	32%	-	-	-	-	-	-	-	-
	CO2	35.00%	NO	-	-	-	-	-	-	-	-	-	-	-	-
	CO3	89.00%	YES	89%	89%	-	-	-	-	-	-	-	-	-	-
	CO4	24.00%	NO	-	-	-	-	-	-	-	-	-	-	-	-
Alternate Building Materials & Technology	CO1	75.00%	YES	75%		-	-	-	-	75%		-	-	-	25%
	CO2	75.00%	YES		75%	-	-	-	-	75%		-	-	-	75%
	CO3	75.00%	YES		-	-	-		-	75%		-	-	-	50%
	CO4	75.00%	YES			75%	-	50%	-	50%	75%	-	-	-	-
Major Project Phase - II	CO1	100.00%	YES	-	-	-	-		-	100%	-	100%	-	-	-
	CO2	100.00%	YES	100%	100%	100%	100%	-	-	-	100%	100%	-	-	100%
	CO3	100.00%	YES	-	-	-	-	100%	-	-	-	100%	-	-	-
	CO4	100.00%	YES	-	-	-	-	-	-	-	-	100%	100%	67%	-
			PO Attainment	**80%**	**78%**	**72%**	**84%**	**72%**	**83%**	**71%**	**69%**	**98%**	**84%**	**67%**	**82%**

Example Weightages for PO Attainment

PO No.	Method of Assessment / Weightage / PO Description	Direct Assessment (CIE)	Direct Assessment (SEE)	Student Exit Survey	Course End Survey	Facu	PO Attainment, %
	Weightage	50%	30% 40	10% 5	5%		
PO 1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	38%	22%	7%	4%		76%
PO 2	Identify, formulate, research literature, and analyz e complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	37%	22%	7%	4%		75%
PO 3	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.	32%	23%	7%	3%		68%
PO 4	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.	39%	23%	7%	4%		77%

PO Attainment

- All POs can be adequately addressed through the selection of core courses and their COs
- Attainable targets can be selected for each of the CO.
- If assessment is in alignment with COs the performance of the students indicates the CO attainment and hence PO attainment.
- These measurements provide the basis for continuous improvement in the quality of learning.

Criterion 4: Students' Performance (120)

NATIONAL BOARD OF ACCREDITATION

Table No. 4A: Admission details for the program excluding those admitted through multiple entry and exit points.

Item (Information is to be provided cumulatively for all the shifts with explicit headings, wherever applicable)	**CAY**	**CAYm1**	**CAYm2**	**CAYm3**	**CAYm4 (LYG)**	**CAYm5 (LYGm1)**	**CAYm6 (LYGm2)**
N= Sanctioned intake of the program (as per AICTE /Competent authority)							
N1= Total no. of students admitted in the 1st year minus the no. of students, who migrated to other programs/ institutions plus no. of students, who migrated to this program							
N2= Number of students admitted in 2nd year in the same batch via lateral entry including leftover seats							
N3= Separate division if any							
N4= Total no. of students admitted in the 1st year via all supernumerary quotas							
Total number of students admitted in the program (N1 + N2 + N3 + N4) - excluding those admitted through multiple entry and exit points.							

CAY= Current Academic Year.
CAYm1= Current Academic Year Minus 1= Current Assessment Year.
CAYm2= Current Academic Year Minus 2= Current Assessment Year Minus 1.
LYG= Last Year Graduate.
LYGm1= Last Year Graduate Minus 1.
LYGm2= Last Year Graduate Minus 2.

Example:

Example for Table **No.4A**: Admission details for the program excluding those admitted through multiple entry and exit points.

Item (Information is to be provided cumulatively for all the shifts with explicit headings, wherever applicable)	**CAY 2023-24**	**CAY*m*1 2022-23**	**CAY*m*2 2021-22**	**CAYm3 2020-21**	**CAYm4 (LYG) 2019-20**	**CAYm5 (LYGm1) 2018-19**	**CAYm6 (LYGm2) 2017-18**
N= Sanctioned intake of the program (as per AICTE /Competent authority)	120	120	120	120	120	120	120
N1= Total no. of students admitted in the 1st year minus the no. of students, who migrated to other programs/ institutions plus no. of students, who migrated to this program	120	120	116	120	120	120	120
N2= Number of students admitted in 2nd year in the same batch via lateral entry including leftover seats	00	11	09	10	11	10	11
N3= Separate division if any	00	00	00	00	00	00	00
N4= Total no. of students admitted in the 1st year via all supernumerary quotas	00	01	00	00	00	00	00
Total number of students admitted in the program (N1 + N2 + N3 + N4) - excluding those admitted through multiple entry and exit points.	120	132	125	130	131	130	131

Criterion 4: Students' Performance (120)

Example for Table No.4B: Admission details for the program through multiple entry and exit points.

Item (No. of students admitted / exited through multiple entry and exit points) in the respective batch		CAY 2023-24	CAYm1 2022-23	CAYm2 2021-22	CAYm3 2020-21	CAYm4 (LYG) 2019-20	CAYm5 (LYGm1) 2018-19	CAYm6 (LYGm2) 2017-18
N5(Multiple entry) **N5=N52+N53+N54**	N52= No. of students admitted **in 2nd year** via multiple entry and exit points in same batch	0 (NA)	2	1	2	1	1	2 (a)
	N53= No. of students admitted **in 3rd year** via multiple entry and exit points in same batch	0 (NA)	0 (NA)	0	0	0	0	1 (b)
	N54= No. of students admitted in 4th year via multiple entry and exit points in same batch	0 (NA)	0 (NA)	0 (NA)	0	0	0	1 (c)
	N5=N52+N53+N54	0 (NA)	2	1	2	1	1	**4**

Criterion 4: Students' Performance (120)

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Example for **Table No.4B**: Admission details for the program through multiple entry and exit points.

Item (No. of students admitted / exited through multiple entry and exit points) in the respective batch		CAY 2023-24	CAY m1 2022-23	CAY m2 2021-22	CAY m3 2020-21	CAYm4 (LYG) 2019-20	CAYm5 (LYGm1) 2018-19	CAYm6 (LYGm2) 2017-18
N6 (Multiple exit) **N6=N61+N62+N63**	N61= No. of students exits after 1st year via multiple entry and exit points in same batch	0 (NA)	1	1	1	0	1	1 (d)
	N62= No. of students exit after 2nd year via multiple entry and exit points	0 (NA)	0 (NA)	0	0	0	0	1 (e)
	N63= No. of students exit after 3rd year via multiple entry and exit points in same batch	0 (NA)	0 (NA)	0 (NA)	0	0	0	0 (f)
N6=N61+N62+N63		0 (NA)	1	1	1	0	1	**2**

Criterion 4: Students' Performance (120)

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Table No. 4C: No. of students graduated within the stipulated period of the program.

Example for **Table No.4C:** No. of students graduated within the stipulated period of the program.

Year of entry	Total no. of students (N1 + *N2* + N3+ N4+N5-N6 as defined above)	Number of students who have successfully graduated in the stipulated period of study **[Total of with Backlogs+ without Backlogs]**			
		I Year	**II Year**	**III Year**	**IV Year**
2024-25 CAY	**120** (120+0+0+0+0(NA)-0(NA)				
2023-24 CAYm1	**133** (120+11+0+1+2-1)	128			
2022-23 CAYm2	**125** (116+9+0+0+1-1)	123	121 (115+6+0+0+1-1)		
2021-22 CAYm3	**131** (120+10+0+0+2-1)	125	123 (112+10+0+0+2-1)	121 (111+10+0+0+0-0)	
2020-21 CAYm4 (LYG)	**132** (120+11+0+0+1-0)	127	125 (114+10+0+0+1-0)	124 (114+10+0+0+0-0)	123 (113+10+0+0+0-0)
2019-20 CAYm5 (LYGm1)	**130** (120+10+0+0+1-1)	125	123 (113+10+0+0+1-1)	122 (112+10+0+0+0-0)	121 (112+9+0+0+0-0)
2018-19 CAYm6 (LYGm2)	**133** (120+11+0+0+4-2)	129	127 (115+11+0+0+2-1)	126 (115+11+0+0+1-1)	124 (115+00+0+0-1)

Criterion 4: Students' Performance (120)

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4.1. Enrolment Ratio in the First Year (20) : **ER Points**= 20 * (Average ER/100)

Example for **Table No.4.1.1:** Student enrolment ratio in the 1st year.

Item (Students enrolled in the First Year on average over 3 academic years (CAY, CAYm1 and CAYm2))	**CAY 2023-24**	**CAYm1 2022-23**	**CAYm2 2021-22**
N= Sanctioned intake of the program in the 1st year (as per AICTE/Competent authority)	120	120	120
N1= Total no. of students admitted in the 1st year minus the no. of students, who migrated to other programs/ institutions plus no. of students, who migrated to this program	120	120	116
N4= Total no. of students admitted in the 1st year via all supernumerary quotas	00	01	00
Enrolment Ratio (ER)= (N1+N4)/N	**100**	**100.83**	**96.67**
Average ER= (ER_1+ ER_2+ ER_3)/3	**99.17%**		

Criterion 4: Students' Performance (120)

Table No. 4.1.2: The marks distribution for enrolment ratio in the 1st year.

Item (Students enrolled in the First Year on average over 3 academic years (CAY, CAYm1 and CAYm2))	**Marks**
>= 90% students enrolled in the First Year on average over 3 academic years (CAY, CAYm1 and CAYm2)	**20**
>= 80% students enrolled in the First Year on average over 3 academic years (CAY, CAYm1 and CAYm2)	**17**
>= 70% students enrolled in the First Year on average over 3 academic years (CAY, CAYm1 and CAYm2)	**14**
>= 60% students enrolled in the First Year on average over 3 academic years (CAY, CAYm1 and CAYm2)	**11**
>= 50% students enrolled in the First Year on average over 3 academic years (CAY, CAYm1 and CAYm2)	**08**
>= 40% students enrolled in the First Year on average over 3 academic years (CAY, CAYm1 and CAYm2)	**05**

Criterion 4: Students' Performance (120)

4.2. Success Rate of the Students in the Stipulated Period of the Program (15)

Success Rate (SR) = (No. of students who graduated from the program in the stipulated course duration) /(No. of students admitted in the 1st year of that batch and those actually admitted in the 2nd year via lateral entry, plus the number of students admitted through multiple entry (if any) and separate division if applicable, minus the number of students who exited through multiple entry (if any).

Average SR = Mean of SR for the past three batches.

SR Points = 1.5 * Average SR/10.

Item	LYG	LYGm1	LYGm2
A=No. of students admitted in the 1st year of that batch and those actually admitted in the 2nd year via lateral entry, plus the number of students admitted through multiple entry (if any) and separate division if applicable, minus the number of students who exited through multiple entry (if any)	230	234	235
B=No. of students who graduated from the programin the stipulated course duration	82	108	108
Success Rate (SR)= (B/A) * 100	0.36	0.46	0.46
Average SR of three batches ((SR_1+ SR_2+SR_3)/3)	0.426		

Note *: If the value of A in Table No. 4.2.1 is less than the sum of the sanctioned intake (N) and the lateral entry including leftover seats (N2), then the value of A in Table No. 4.2.1 should be the sum of the sanctioned intake (N) and the lateral entry including leftover seats (N2).

Criterion 4: Students' Performance (120)

4.3. Academic Performance of the First-Year Students of the Program (10)

Academic Performance = Average Academic Performance Index (API), where API = ((Mean of 1st Year Grade Point Average of all successful students on a 10-point scale) or (Mean of the percentage of marks of all successful students in 1st year/10)) * (Number of successful students/number of students appeared in the examination)

Successful students are those who have to proceeded to the 2nd year.

Academic Performance	CAYm1	CAYm2	CAYm3
X= (Mean of 1st year grade point average of all successful students on a 10-point scale) or (Mean of the percentage of marks of all successful students in 1st year/10)			
Y= Total no. of successful students			
Z = Total no. of students appeared in the examination			
API = X* (Y/Z)	AP1	AP2	AP3
Average API = (AP1 + AP2 + AP3)/3			

Criterion 4: Students’ Performance (120)

4.4 Academic Performance of the Second Year Students of the Program (10)

Academic Performance = Average Academic Performance Index (API), where, API = ((Mean of 2nd Year Grade Point Average of all successful students on a 10-point scale) or (Mean of the percentage of marks of all successful students in 2nd Year/10)) * (Number of successful students/number of students appeared in the examination).

Successful students are those who have proceeded to the 3rd year.

Academic Performance	CAYm1	CAYm2	CAYm3
X= (Mean of 2nd year grade point average of all successful students on a 10-point scale) or (Mean of the percentage of marks of all successful students in 2nd year/10)	5.91	7.70	7.06
Y= Total no. of successful students	189	177	187
Z = Total no. of students appeared in the examination	193	177	211
API = X* (Y/Z)	AP1 =5.79	AP2 = 7.70	AP3 = 6.26
Average API = (AP1 + AP2 + AP3)/3	**6.58**		

Criterion 4: Students' Performance (120)

4.5 Academic Performance of the Third Year Students of the Program (10)

Academic Performance = Average Academic Performance Index (API), where, API = ((Mean of 3rd Year Grade Point Average of all successful students on a 10-point scale) or (Mean of the percentage of marks of all successful students in 3rd Year/10)) * (Number of successful students/number of students appeared in the examination).

Successful students are those who have proceeded to the 4th year

Academic Performance	CAYm1	CAYm2	CAYm3
X= (Mean of 3rd year grade point average of all successful students on a 10-point scale) or (Mean of the percentage of marks of all successful students in 3rd year/10)			
Y= Total no. of successful students			
Z = Total no. of students appeared in the examination			
API = X* (Y/Z)	AP1	AP2	AP3
Average API = (AP1 + AP2 + AP3)/3			

Criterion 4: Students’ Performance (120)

4.6 Placement, Higher Studies and Entrepreneurship (30)

Placement index points= 0.3 * Average placement index (P),

Table No. 4.6.1: Placement, higher studies, and entrepreneurship details.

Item	LYG	LYGm1	LYGm2
FS*=Total no. of final year students			
X= No. of students placed			
Y= No. of students admitted to higher studies			
Z= No. of students taking up entrepreneurship			
X + Y + Z =	P_1	P_2	P-3
Placement Index (P) = (((X + Y + Z)/FS) * 100)			
Average placement index = (P_1 + P_2 + P_3)/3			

Note *: If the value of FS in Table No. 4.6.1 is less than the sum of the sanctioned intake (N) and the lateral entry including leftover seats (N2), then the value of FS in Table No. 4.6.1 should be the sum of the sanctioned intake (N) and the lateral entry including leftover seats (N2).

4.7 Professional Activities (25)

4.7.1 Professional Societies/ Bodies, Chapters, Clubs, and Professional Engineering Events Organized (05)

(Provide a list of active professional societies/bodies, chapters, and clubs that exist at the departmental/cluster level in the past 3 years, and also provide a list of events organized by the professional societies, chapters, and clubs over the past 3 years.)

4.7.2 Student's Participations in Professional Events (10)

(Provide details of students, who have participated at other institutes in various professional events, such as hackathons, codeathons, ideathons, etc., over the past 3 years.)

4.7.3 Publication of Journals, Magazines, Newsletters, etc. in the Department (05)

(Provide details of journals, magazines, newsletters, etc., published by the department, along with the names of the editors, issue numbers, volume numbers, and a list of students involved for the past 3 years.)

Table No. 4.7.3.1: List of students involved in publication of journals, magazines, and newsletters, etc. in the Department.

S.N.	Name of the Journal, Magazine, Newsletter	Name of the Editor	Name of the Student & Semester	No. of Issues	Hard copy/ Soft copy
CAYm1					
1.					
....					
CAYm2					
1.					
...					
CAYm3					
1.					
...					

4.7.4 Student Publications (05)

(Provide details of student publications in journals, conferences, etc., for the past 3 years.)

Table No. 4.7.4.1: List of student publications.

S.N.	Name of the Student & Semester	Name of the Publisher	Name of the Journal/ Conference, etc.	Volume No. & Issue No.	Name of the Award if any
CAYm1					
1.					
....					
CAYm2					
1.					
...					
CAYm3					
1.					
...					

Criterion 5: Faculty Information (100)

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Table No. 5A: Faculty details

S.N.	Name of the Faculty	PAN No.	APAAR faculty ID*(if any)	Highest degree	University	Area of Specialization	Date of Joining in this Institution	Experience in years in current institute	Designation at Time Joining in this Institution			Nature of Association (Regular/ Contract/ Ad hoc)			
1.															
….															

Criterion 5: Faculty Information (100)

Note 1: Please provide details of the faculty in the Department and allied Departments, including cumulative information for all three academic years starting from the current academic year (CAY) in the specified format. Programs such as MCA, BCA, and other non-engineering programs running in the Department or allied Departments need to have sufficient faculty members to support those programs. Note that these faculty members should not be included in the above said Table no. 5A.

Note 2: All the faculty whether regular or contractual (except part-time or hourly based), will be considered. All regular faculty members shall meet the AICTE qualifications and experience requirements. The contractual faculty appointed with any terminology whatsoever, who have taught for 2 consecutive semesters with or without break between the 2 semesters in corresponding academic year on full-time basis shall be considered for the purpose of **calculation in the faculty student ratio**. However, following will be ensured in case of contractual faculty.

Criterion 5: Faculty Information (100)

A. Shall have the AICTE prescribed qualifications and experience.

B. **Shall be appointed on full time basis and worked for consecutive two semesters with or without break between the 2 semesters during the particular academic year under consideration**.

C. Should have gone through an appropriate process of selection and the records of the same shall be made available to the visiting team during NBA visit.

Note 3:

A. Faculty members in the Department who do not have teaching, or practical loads, will not be counted.

B. Director/ Principal/ Dean/ other academic/administrative posts, who has teaching/ practical load in the Department will be counted.

C. Visiting faculty/adjunct faculty, who are working on hourly based faculty will not be counted

Criterion 5: Faculty Information (100)

5.1. Student-Faculty Ratio (30)

(SFR to be calculated at **Department level** considering all UG and PG engineering programs in the Department; **include allied department programs/clusters as well.)**

- No. of **UG (Engineering) programs** in Department including allied departments/clusters (UG_n):
  - UG_1=1st UG program
  - UG_n= nth UG program
    - **B=** No. of Students in UG 2nd year (**ST**)
    - **C=** No. of Students in UG 3rd year (**ST**)
    - **D=** No. of Students in UG 4th year (**ST**)

Criterion 5: Faculty Information (100)

- No. of PG (Engineering) programs in Department including allied departments/ clusters (PG_m):
  - PG_1=1st PG program.
  - PG_m=mth PG program
    - **A=** No. of Students in PG 1st year
    - **B=** No. of Students in PG 2nd year
- **Student Faculty Ratio (SFR) = S/F**
  - **S**=No. of students of all programs in the Department including all students of allied departments / clusters.
    - **No. of students (ST)=**Sanctioned Intake (SA) + Actual admitted students via lateral entry including leftover seats (L) if any (limited to 10 % of SA)
    - Students who admitted under supernumerary quotas (SNQ, EWS, etc) will not be considered in calculating SFR value. Those students are **exempted**.
  - **F**= **Total no. of regular or contractual faculty members (Full Time) in the Department, including allied departments/clusters** (excluding first year faculty (The faculty members who have a 100% teaching load in the first-year courses)).

Criterion 5: Faculty Information (100)

Example: Table No. 5.1.1: Calculation of no. of students admitted in the program though lateral entry or left-over seats.

Let assume that sanctioned intake of the program (SA)=120				
Example case	**No. of students admitted in 1st year**	**Leftover seats/ Unfilled seats in 1st year**	**No. of actually students admitted in 2nd year, L= a+ b; a=Lateral entry admission (maximum 10% of SA) b=Leftover seats admitted in 2nd year**	**No. of students in the program to be considered for SFR calculation (ST) = (SA + L) limited to 110 % of SA**
Case 1	**120**	**00**	**00**	**120 (120+00)**
Case 2	**120**	**00**	**12**	**132 (120+12)**
Case 3	**120**	**00**	**06**	**126 (120+06)**
Case 4	**60**	**60**	**00**	**120 (120+00)**
Case 5	**75**	**45**	**06**	**126 (120+06)**
Case 6	**82**	**38**	**12**	**132 (120+12)**
Case 7	**88**	**32**	**44***	**132 (120+12)**
Case 8	**60**	**60**	**42***	**132 (120+12)**

***Note:** If the number of students admitted in 2nd year via lateral entry including left over seats (L) is more than 10% of the sanctioned intake in the respective program, then the total number of students considered to be admitted in the program (ST) should be the sanctioned intake program plus 10% of the sanctioned intake program. Additionally, the (ST) value cannot exceed 132 in the given example.

Criterion 5: Faculty Information (100)

Example1: Computer Science and Engineering Department (Cluster Programs)/ (See Annexure-III):

If the College offers a cluster of Undergraduate(UG) engineering programs & Postgraduate (PG) Engineering Programs in for example **Computer Science and Engineering (CSE),** such as UG-Engineering-CSE, UG-Engineering-CSE (Artificial Intelligence), UG-Engineering-CSE (Artificial Intelligence and Machine Learning), UG-Engineering-CSE (Cyber Security), UG-Engineering-CSE (Data Science), UG-Engineering-Information Technology, PG-Engineering-CSE within the Department or a separate Department, they will be counted as **one cluster(Department**). The SFR should be calculated as follows:

Criterion 5: Faculty Information (100)

- No. of UG ((Engineering) Programs **in Department** including allied departments/clusters (UG_n): 6

1. UG_1=UG-Engineering-CSE
2. UG_2=UG-Engineering-CSE (Artificial Intelligence)
3. UG_3=UG-Engineering-CSE (Artificial Intelligence and Machine Learning)
4. UG_4=UG-Engineering-CSE (Cyber Security)
5. UG_5=UG-Engineering-CSE (Data Science)
6. UG_6=UG-Engineering-Information Technology

Criterion 5: Faculty Information (100)

- No. of PG ((Engineering) Programs in Department including allied departments/clusters (PG_m): 1

1. PG_1=PG-Engineering-CSE.

Let's assume that the **Department of Computer Science** is offering programs Such as UG1=UG-Engineering-CSE, UG2=UG-Engineering-CSE (Artificial Intelligence), UG3=UG-Engineering-CSE (Artificial Intelligence and Machine Learning), UG4=UG-Engineering-CSE (Cyber Security), UG5=UG-Engineering-CSE (Data Science), and PG1=PG-Engineering-CSE. Additionally, **Allied Departments like Information Technology** is offering UG6=UG-Engineering-Information Technology in the above said example. The SFR is to be calculated as follows:

Criterion 5: Faculty Information (100)

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Example: Student-Faculty Ratio for Table No. 5.1.2.

Year	CAY	CAYm1	CAYm2
UG_1. B	132	132	131
UG_1. C	132	131	130
UG_1. D	131	130	129
UG_1 **(UG-Engineering-CSE)**	395	393	390
UG_2. B	131	130	125
UG_2. C	130	125	130
UG_2. D	125	130	123
UG_2 **(UG-Engineering-CSE (Artificial Intelligence))**	386	385	378

Criterion 5: Faculty Information (100)

Example: Student-Faculty Ratio for Table No. 5.1.2.

Year	CAY	CAYm1	CAYm2
UG_3. B	126	122	120
UG_3. C	122	120	112
UG_3. D	120	122	119
UG_3 **(UG-Engineering-CSE (Artificial Intelligence and Machine Learning))**	368	364	351
UG_4. B	132	132	130
UG_4. C	132	130	130
UG_4. D	130	130	129
UG_4 **(UG-Engineering-CSE (Cyber Security))**	394	392	389

Criterion 5: Faculty Information (100)

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Example: Student-Faculty Ratio for Table No. 5.1.2.

Year	CAY	CAYm1	CAYm2
UG_5. B	131	130	124
UG_5. C	130	124	130
UG_5. D	124	130	121
UG_5 **(UG-Engineering-CSE (Data science))**	385	384	375
UG_6. B	132	131	130
UG_6. C	131	130	130
UG_6. D	130	130	128
UG_6 **(UG-Engineering (Information Technology))**	393	391	388

Criterion 5: Faculty Information (100)

Example: Student-Faculty Ratio for ***Table No. 5.1.2.***

Year	CAY	CAYm1	CAYm2
PG_1. A	18	18	18
PG_1. B	18	18	18
PG_1 **(PG-Engineering-CSE)**	36	36	36
DS=Total no. of students in the Department (UG_1, UG_2, UG_4, UG_5, PG_1)	**1964**	**1954**	**1919**
AS=Total no. of students in allied departments (UG_6)	393	391	388
S=Total no. of students in the Department (DS) and allied departments (AS)	**S1=2,357 (2,321 (all UGs) +36(PG))**	**S2=2,345 (2,309(all UGs)+36(PG))**	**S3=2,307 (2,271(all UGs)+36(PG))**

Criterion 5: Faculty Information (100)

Example: Student-Faculty Ratio for Table No. 5.1.2.

Year	CAY	CAYm1	CAYm2
DF=No. of faculty members in the Department	95	99	100
AF=No. of faculty members in the allied Departments	25	25	25
F=Total no. of faculty members in the Department (DF) and allied Departments (AF)	F1= 120	F2= 124	F3= 125
FF=The faculty members who have a 100% teaching load in the first-year courses	00	00	00
Student Faculty Ratio (SFR)=S/(F-FF)	SFR1=2,357/120= 19.64	SFR2=2,345/124= 18.91	SFR3=2,307/125= 18.46
Average SFR for 3 years	Average SFR= (19.64+18.91+18.46)/3=**19.00**		

Criterion 5: Faculty Information (100)

Note:

Marks to be given proportionally from a maximum of 30 to a minimum of 10 for average SFR between 15:1 to 25:1, and zero for average SFR higher than 25:1. Marks distribution is given as below:

SFR	< 15 - 30 Marks
	< 17 - 26 Marks
	< 19 - 22 Marks
	< 21 - 18 Marks
	< 23 - 14 Marks
	< 25 - 10 Marks
	> 25 - 00 Mark

Criterion 5: Faculty Information (100)

5.2. Faculty Qualification (25)

- Faculty qualification index (FQI) = **2.5 * [(10X +4Y)/RF]** where
  - X=No. of faculty members with Ph.D. degree or equivalent as per AICTE/UGC norms.
  - Y=No. of faculty members with M. Tech. or ME degree or equivalent as per AICTE/ UGC norms.
  - RF=No. of required faculty in the Department including allied Departments to adhere to the 20:1 Student-Faculty ratio, with calculations based on both student numbers and faculty requirements as per section 5.1 of SAR; (RF=S/20).

Criterion 5: Faculty Information (100)

Table No.5.2.1: Faculty qualification.

Year	X	Y	RF	FQI=**2.5 * [(10X +4Y)/RF]**
CAY				
CAYm1				
CAYm2				
Average Assessment				

Note:

- To determine the RF value (No. of required faculty in the Department, including allied Departments to adhere to the 20:1 Student-Faculty ratio), all students (**S as defined in section 5.1 of SAR**) in the department, as well as those in allied departments, need to be considered.
- The programs, such as MCA, BCA, and other non-engineering programs running in the Department or allied Departments, need to have sufficient faculty members to support those programs and exclude the faculty members and students listed in Table No. 5.2.1 (X, Y, and RF)

Criterion 5: Faculty Information (100)

5.3. Faculty Cadre Proportion (25)

- **Faculty Cadre Proportion is 1(RF1): 2(RF2): 6(RF3)**
  - RF1=No. of Professors required = 1/9 * No. of Faculty required to comply with 20:1 Student-Faculty ratio based on no. of students (S) as per section 5.1 of SAR.
  - RF2= No. of Associate Professors required = 2/9 * No. of Faculty required to comply with 20:1 Student-Faculty ratio based on no. of students (S) as per section 5.1 of SAR.
  - RF3= No. of Assistant Professors required = 6/9 * No. of Faculty required to comply with 20:1 Student-Faculty ratio based on no. of students (S) as per section 5.1 of SAR.
- Faculty cadre and qualification and experience should be as per AICTE/UGC norms.

Criterion 5: Faculty Information (100)

Table No.5.3.1: Faculty cadre proportion details.

Year	Professor		Associate Professor		Assistant Professor	
	Required Faculty (RF1)	Available Faculty (AF1)	Required Faculty (RF2)	Available Faculty (AF2)	Required Faculty (RF3)	Available Faculty (AF3)
CAY						
CAYm1						
CAYm2						
Average Numbers	RF1=	AF1=	RF2=	AF2=	RF3=	AF3=

Criterion 5: Faculty Information (100)

$$\text{Faculty Cadre Proportion Marks} = \left[\left[\frac{AF1}{RF1}\right] + \left[\frac{AF2}{RF2} * 0.6\right] + \left[\frac{AF3}{RF3} * 0.4\right] \right] * 12.5$$

- If AF1 = AF2= 0, then zero mark
- Maximum marks should be limited to 25 if they exceed the allocated marks
  - Case 1: AF1/RF1=1; AF2/RF2=1; AF3/RF3=1

    Faculty Cadre Proportion marks= (1+0.6+0.4) * 12.5=25.
  - Case 2: AF1/RF1=1; AF2/RF2=4/2; AF3/RF3=8/9

    Faculty Cadre Proportion marks=(1+1.2+0.36)* 12.5=32(limited to 25)

Criterion 5: Faculty Information (100)

Note:

- **All Professors (RF1, AF1), all Associate Professors (RF2, AF2), and all Assistant Professors (RF3, AF3) in the department, as well as those in allied departments, should be considered for the calculation of faculty cadre proportion marks**
- To determine the RF1, RF2, and RF3 values, all students (S as defined in the section 5.1 of SAR) in the department, as well as those in allied departments, need to be considered.
- The programs, such as MCA, BCA, and other non-engineering programs running in the Department or allied Departments, need to have sufficient faculty members to support them and exclude the faculty members listed in Table No. 5.3.1 (AF1, AF2, AF3).

Criterion 5: Faculty Information (100)

5.4. Visiting/Adjunct Faculty/Professor of Practice (10)

(Provide details of participation and contributions in teaching, learning, or practical work by visiting, adjunct, emeritus faculty, professors of practice, etc., from industry, research organizations & reputed institutions as well as retired professors, during the assessment period.)

- Provision of visiting or adjunct faculty/emeritus professor/professor of practice etc. (1)
- **Minimum 50 hours per year of interaction** with adjunct faculty from industry or research organization, retired professors, etc. (9)
- A minimum of 50 hours of interaction in a year will result in 3 marks for that year (3 marks * 3 years = 9 marks).

Criterion 5: Faculty Information (100)

5.5. Faculty Retention (10)

Table No.5.5.1: Faculty retention ratio.

Item	CAYm1	CAYm2	CAYm3
RF=No. of required faculty in the Department including allied Departments to adhere to the 20:1 Student-Faculty ratio, with calculations based on both student numbers and faculty requirements as per section 5.1 of SAR; (RF=S/20).			
AF=The no. of available faculty members in the Department including allied Departments			
A= The no. of faculty members at the current institute with **less than 1 year of experience** (A in AF)			
B= The no. of faculty members at the current institute with more than 1 year and less than 2 years of experience (B in AF)			

Criterion 5: Faculty Information (100)

Table No.5.5.1: Faculty retention ratio.

Item	CAYm1	CAYm2	CAYm3
C= The no. of faculty members at the current institute with more than 2 years and less than 3 years of experience (C in AF)			
D= The no. of faculty members at the current institute with more than 3 years and less than 4 years of experience (D in AF)			
E= The no. of faculty members at the current institute with more than 4 years of experience (E in AF)			
FR=(((A*0)+(B*1)+(C*2)+(D*3)+(E*4))/RF) *2.50 (points limited to 10]	FR_1	FR_2	FR_3
Average FR= ((FR_1+ FR_2+ FR_3)/3) (marks limited to 10)			

Criterion 5: Faculty Information (100)

Example for Table No.5.5.1: Faculty retention ratio.

Item	CAYm1	CAYm2	CAYm3
RF=No. of required faculty in the Department including allied Departments to adhere to the 20:1 Student-Faculty ratio, with calculations based on both student numbers and faculty requirements as per section 5.1 of SAR; (RF=S/20).	**2,357/20 =117**	**2,345/20 =117**	**2,307/20 =115**
AF=The no. of available faculty members in the Department including allied Departments	120	124	125
A= The no. of faculty members at the current institute with less than 1 year of experience (A in AF)	1	0	2
B= The no. of faculty members at the current institute with more than 1 year and less than 2 years of experience (B in AF)	2	3	10

Criterion 5: Faculty Information (100)

Example for Table No.5.5.1: Faculty retention ratio.

Item	CAYm1	CAYm2	CAYm3
C= The no. of faculty members at the current institute with more than 2 years and less than 3 years of experience (C in AF)	1	2	2
D= The no. of faculty members at the current institute with more than 3 years and less than 4 years of experience (D in AF)	1	0	1
E= The no. of faculty members at the current institute with more than 4 years of experience (E in AF)	115	119	110
FR= (((A*0)+(B*1)+(C*2)+(D*3)+(E*4))/RF) *2.50 (points limited to 10	FR_1= ((0+2+2+3 +460) /117) *2.50 = 9.98	FR_2= ((0+3+4+0 +476) /117) *2.50= 10(10.32)	FR_3= ((0+10+4+ 3 + 440)/115) *2.50 = 9.93
Average FR= ((FR_1+ FR_2+ FR_3)/3) (marks limited to 10)	(9.98+10+9.93)/3=29.04/3=9.97		

Criterion 6: Faculty Contribution (120)

6.1. Professional Development Activities (60)

6.1.1. Memberships in Profession Societies at National / International Levels (05)

(Provide details of faculty members, who have active recognized professional memberships and their positions and contributions to professional societies during the assessment period.)

Table No. 6.1.1.1: List of faculty members and their memberships.

S. N.	Name of the Faculty	Name of the Professional Society /Body at National and International Level	Name of the Grade/ Level/Position
1		❖ ❖	❖ ❖
…..			

Criterion 6: Faculty Contribution (120)

6.1.2. Faculty as Resource Persons or Participants in STTPs/FDPs (10)

6.1.2.1. Faculty as Resource Persons in STTPs/FDPs (05)

(Provide details of the faculty involved as **resource persons** in STTP/FDP events during the assessment period.)

Table No. 6.1.2.1.1: List of faculty members as resource person in STTP/FDP

S.N.	Name of the Faculty as Resource Person	Name of the STTP/FDP	Date	Location	Organized by
CAYm1					
1.					
.....					
CAYm2					
1.					
.....					
CAYm3					
1.					
.....					

Criterion 6: Faculty Contribution (120)

6.1.2.2. Faculty Members' Participation in STTPs/FDPs (05)

(Provide details of **faculty participated** in STTP/FDP events during the assessment period with special reference to the faculty competency for the program under consideration for accreditation. Please do not give duplicate data from the section 6.1.4.)

- ❖ A Faculty scores maximum five points for participation
- ❖ Participation in 2 to 5 days Faculty/ Faculty development program: 3 Points
- ❖ Participation in >5 days Faculty/ Faculty development program: 5 points.

Criterion 6: Faculty Contribution (120)

6.1.3. Faculty Contribution in Development of SWAYAM MOOCs and other E-Content (05)

(Provide details of faculty members developed courses for various educational initiatives, including SWAYAM MOOCs/SWAYM PLUS/NPTEL, e-PG Pathshala and other e-contents during the assessment period.)

Table No. 6.1.3.1: List of faculty members developed MOOC course for the past 3 years.

S. N.	Name of the Faculty	Name of the Course Developed and available online on Swayam platform by your Department faculty
1.		
....		
N		

Criterion 6: Faculty Contribution (120)

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6.1.4. Faculty Certification of MOOCs through SWAYAM, etc. (10)

(Provide details of faculty members, who have obtained MOOCs (Massive Open Online Courses) certification through platforms like SWAYAM/SWAYM PLUS/NPTEL and other approved programs during the assessment period.)

Table No. 6.1.4.1: List of faculty members obtained certification of MOOCs for the past 3 years.

S. N.	Name of the Faculty	Name of Course Passed	Course Offered by (agency)	Grade obtained if any
1.				
….				
N				

Criterion 6: Faculty Contribution (120)

6.1.5. FDP/STTP Organized by the Department (10)

(Provide details of the number of faculty development programs and short-term training programs organized by the department individually or in collaboration with other departments over the past 3 years.)

- ❖ The minimum duration of FDP/STTP is 5 days.
- ❖ 2 points per FDP/STTP, with a maximum of 4 marks per assessment year and a total maximum of 10 marks

S. N.	Name of the Program	Date of the Program	Duration of the Program	Name of the Speaker & Designation and Organization	No. of People Attended
CAYm1					
1					
....					
CAYm2					
1					
.....					
CAYm3					
1					
.....					

Criterion 6: Faculty Contribution (120)

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6.1.6. Faculty Support in Student Innovative Projects (10)

(Provide details of faculty supports as a mentor, facilitator, etc. in student innovation projects in various events like hackathons, codeathons, ideathons, open research, etc.)

Table No. 6.1.5.1: List of FDPs/STPs organized by Department for the past 3 years.

S. N.	Name of the Faculty	Name of the Event	Date of Event	Place of Event	Website link, if any
CAYm1					
1					
….					
CAYm2					
1					
…..					
CAYm3					
1					
…..					

6.1.7. Faculty Internship/Training/Collaboration with Industry (10)

(Provide details of faculty members who have undergone internships or training in industry and research organizations, or a list of faculty members who are actively collaborating with industry.

(*The outcomes of internships, training, and collaborations including the number of programs organized for students and faculty members, the development of working models and prototypes, the publication of joint research papers, the number of funded projects received, etc. for the assessment period.)*

S.N.	Name of the Faculty	Name of the Internship/Training/ Collaboration	Name of the Company & Place	Duration	Outcomes of Internship/ Training/ Collaboration
1		❖ ❖	❖ ❖	❖	❖ ❖
……		❖	❖	❖	❖

Criterion 6: Faculty Contribution (120)

6.2. Research and Development Activities (60)

6.2.1. Academic Research (10)

(Provide details of compiled list including research papers, available online or in hard-copy, from reputable publishers and should be list of Scopus/WoS. Only papers with the faculty member's affiliation aligned with the current institution are considered. Each entry in the comprehensive list includes details such as DOI, publisher, and month/year of publication).

S.N.	Item	CAYm1	CAYm2	CAYm3
1	No. of peer reviewed journal papers published			
2	No. of peer reviewed conference papers published			
3	No. of books/book chapters published			

6.2.2. Ph.D. Student Details (05)

S.N.	Item	CAYm1	CAYm2	CAYm3
1	No. of students enrolled for Ph.D. in the Department			
2	No. of Ph.D. students graduated in the Department			

Criterion 6: Faculty Contribution (120)

6.2.3. Development Activities (10)

(Provide details of patents granted/published, working models, and prototypes developed by faculty members in the last 3 years.)

6.2.4. Sponsored Research Project (15)

(Provide details of funded research projects from the external sources including Corporate Social Responsibility (CSR). List includes Principal Investigator (PI), Co-PI name, name of the dept where project is sanctioned, project title, funding agency, sanctioned amount, duration and sanctioned year. Also, provide the **cumulative funding amount received during CAYm1, CAYm2, and CAYm3.** Please do not give duplicate data from the sections 6.2.5 and 6.2.6.)

- Amount >20 Lacs – 15 Marks
- Amount >16 Lacs and < 20 lacs– 12 Marks
- Amount >12 Lacs and < 16 lacs –9 Marks
- Amount > 8 Lacs and < 12 lacs –6 Marks
- Amount > 4 Lacs and < 8 lacs –3 Marks
- Amount > 1 Lacs and < 4 lacs –1 Mark
- Amount < 1 Lac – 0 Mark.

Criterion 6: Faculty Contribution (120)

6.2.5. Consultancy Work (15)

(Provide details of consultancy projects from the external sources. List includes Principal Investigator (PI), Co-PI name, name of the dept where project is sanctioned, project title, funding agency, sanctioned amount, duration and sanctioned year. Also, provide the **cumulative funding amount received** during CAYm1, CAYm2, and CAYm3. Please do not give duplicate data from the sections 6.2.4 and 6.2.6.)

- **Amount >20 Lacs – 15 Marks**
- Amount >16 Lacs and < 20 lacs–12 Marks
- Amount >12 Lacs and < 16 lacs –9 Marks
- Amount > 8 Lacs and < 12 lacs –6 Marks
- Amount > 4 Lacs and <8 lacs –3 Marks
- Amount > 1 Lacs and <4 lacs –1 Mark
- Amount < 1 Lac – 0 Mark.

Criterion 6: Faculty Contribution (120)

6.2.6. Institution Seed Money or Internal Research Grant to its Faculty for Research Work (05)

(Provide details of faculty members received Institution seed money grants to its faculty for research work. Also, provide the cumulative funding amount received and utilized during CAYm1, CAYm2, and CAYm3. Please do not give duplicate data from the sections 6.2.4 and 6.2.5. The outcomes of the project are no. of publications, no. of working models/prototypes, no. of Ph.D. students graduated, no. of M.E students graduated, amount generated, etc.)

Amount received (3 marks)

- Amount > 6 Lacs – 3 Marks
- Amount > 4 Lacs and < 6 lacs– 2 Marks
- Amount > 2 Lacs and < 4 lacs – 1 Mark
- Amount < 1 Lac – 0 Mark.

Amount utilized (2 marks).

Criterion 7: Facilities and Technical Support (100)

7.1. Adequate and Well-Equipped Laboratories, and Technical Manpower (40)

(Provide details of various laboratories for the program and at the department level. Also, please provide a list of technical support staff appointed by the College for the Department and their qualifications. Please do not give duplicate data from the sections 7.2 and 7.5.)

S. N.	Name of the Laboratory	No. of students per setup (Batch Size)	Name of the major equipment	Weekly utilization status (all the courses for which the lab is utilized)	Technical Manpower support		
					Name of the technical staff	Name of the technical staff	Qualification
1.							
….							
N.							

Criterion 7: Facilities and Technical Support (100)

7.2. Additional Facilities Created for Improving the Quality of Learning Experience in Laboratories (20)

(Provide details of various additional facilities provided by the department to enhance the quality of learning in laboratories. Please do not give duplicate data from the sections 7.1 and 7.5.)

Table No.7.2.1: List of additional facilities.

S. N.	Name of the Facility	Details	Purpose for creating facility	Utilization	Relevance to Pos/PSOs
1.					
….					
N.					

Criterion 7: Facilities and Technical Support (100)

7.3. Maintenance of Laboratories and Overall Ambiance (10)

(Provide details of overall laboratories maintenance and overall ambiance in the Department.)

7.4. Safety Measures in Laboratories (10)

(Provide details of various safety measures deployed in each laboratory within the Department.)

7.5. Project Laboratory / Research Laboratory / Centre of Excellence (20)

(Provide details of laboratories for supporting projects, research, Centre of Excellence, innovation, and startups etc. Please do not give duplicate data from the sections 7.1 and 7.2.)

8. 1. Actions Taken Based on the Results of Evaluation of the COs, POs, and PSOs (40)

8.1.1. Actions Taken Based on the Results of Evaluation of the COs Attainment (20)

(Identify the areas of weaknesses in the program based on the analysis of evaluation of COs attainment levels. Measures identified and implemented to improve COs attainment levels for the assessment year (CAYm1) including curriculum intervention, pedagogical initiatives, support system improvements, etc.)

Criterion 8: Continuous Improvement (80)

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8.1.2. Actions Taken Based on the Results of Evaluation of the POs/PSOs Attainment (20)

(Identify the areas of weaknesses in the program based on the analysis of evaluation of POs/PSOs attainment levels. Measures identified and implemented during two years to improve POs attainment levels including curriculum intervention, pedagogical initiatives, support system improvements, etc.)

8.2. Academic Audit and Actions Taken thereof during the Period of Assessment (15)

(Academic audit system/process and its implementation in relation to continuous improvement.)

Criterion 8: Continuous Improvement (80)

8.3. Improvement in Faculty Qualification/Contribution (15)

(Assessment is based on improvement in qualification and publications with respect to the Department)

Table No.8.3.1: Improvement in qualification and publications

Item	CAYm1	CAYm2	CAYm3
No. of faculty members with Ph.D. degree			
No. of publications in peer reviewed journals			
No. of publications in conferences			

8.4. Improvement in Academic Performance (10)

(Provide details of improvement in academic performance of 1st year, 2nd year, 3rd year students during the assessment period.)

Table No.8.4.1: Improvement in academic performance

Item	CAYm1	CAYm2	CAYm3
Academic Performance Index (API) of the First-Year Students in the Program (Refer to section 4.3)			
Academic Performance Index of the Second-Year Students in the Program (Refer to section 4.4)			
Academic Performance Index of the Third Year Students in the Program (Refer to section 4.5)			

Criterion 9: Student Support System and Governance (120)

9.1. First Year Student-Faculty Ratio (FYSFR) (05)

Table No. 9.1.1: FYSFR details.

Year	**Sanctioned intake of all UG programs (S4)**	**No. of required faculty (RF4= S4/20)**	**No. of faculty members in Basic Science Courses & Humanities and Social Sciences including Management courses (NS1)**	**No. of faculty members in Engineering Science Courses (NS2)**	**Percentage= No. of faculty members ((NS1*0.8) +(NS2*0.2))/(No. of required faculty (RF4)); Percentage=((NS1*0.8)+ (NS2*0.2))/RF4**
CAY					
CAY*m*1					
CAYm2					
				Average Percentage	

Note:

Ex: If S4=240, the Institute needs a minimum of 2 faculty members in Physics, 2 in Chemistry, and 4 in Mathematics.

Ex: If S4=420, the Institute needs a minimum of 4 faculty members in Physics, 4 in Chemistry, and 5 in Mathematics.

Ex: If S4=720, the Institute needs a minimum of 6 faculty members in Physics, 6 in Chemistry, and 8 in Mathematics.

For intake (S4) is more than 720, an FYSFR of 1:20 shall be maintained approximately.

Average Percentage > 80% of faculty members; 5 marks.

$\geq$ 70% to < 80 of faculty members; 4 marks.

$\geq$ 60% to < 70 of faculty members; 3 marks.

$\geq$ 50% to < 60 of faculty members; 2 marks.

$\geq$ 40% to < 50 of faculty members; 1 mark.

< 40% of faculty members; 0 mark.

Criterion 9: Student Support System and Governance (120)

Example for **Table No. 9.1.1**: FYSFR details

Year	**Sanctioned intake of all UG programs (S4)**	**No. of required faculty (RF4= S4/20)**	**No. of faculty members in Basic Science Courses & Humanities and Social Sciences including Management courses (NS1)**	**No. of faculty members in Engineering Science Courses (NS2)**	**Percentage= No. of faculty members ((NS1*0.8) +(NS2*0.2))/(No. of required faculty (RF4)); Percentage=((NS1*0.8)+ (NS2*0.2))/RF4**
CAY	300	15	18	3	((18*0.8) +(3*0.2))/15 =(14.4+0.6)/15=15/15=100%
CAY*m*1	300	15	16	2	((16*0.8) +(2*0.2))/15 =(12.8+0.4)/15=13.2/15=86%
CAYm2	240	12	10	2	((10*0.8) +(2*0.2))/12 =(8+0.4)/12=8.4/12=70%
				Average Percentage	85.33 (5 marks)

Criterion 9: Student Support System and Governance (120)

9.2. Mentoring System (05)

(Type of mentoring: Professional guidance/career advancement/course work specific/laboratory specific/all-round development. Number of faculty mentors: Number of students per mentor: Frequency of meeting:

The institution should report the details of the mentoring system, its implementation and effectiveness through impact studies, services both online and physical, and the mentoring of seniors (final year students) to juniors (freshmen) if any, etc.).

Criterion 9: Student Support System and Governance (120)

9.3. Feedback Analysis (10)

9.3.1. Feedback on Teaching and Learning Process and Corrective Measures Taken, if any (05)

(Provide details of the feedback collection process on TLP, average percentage of students who participate; Specify the feedback analysis process; Basis of reward/ corrective measures during the assessment period. Specify the number of corrective measures taken. Exhibit the details of analysis done.)

9.3.2. Feedback on Academic Facilities (05)

(Provide details of the feedback collection process on facilities, its analysis and corrective actions taken during the assessment period.)

Criterion 9: Student Support System and Governance (120)

9.4. Training and Placement Support (10)

(Provide details of the training and placement supports, calendar of scheduled trainings, career guidance and effectiveness of career guidance, industry interaction exclusively for pre-placement/internship/placement /counseling and support for higher study etc.)

9.5. Start-up and Entrepreneurship Activities (05)

(Describe the initiatives, facilities created/utilization and their effectiveness in encouraging students for innovation, entrepreneurship, incubation and start-up. Also provide the list of beneficiaries.)

9.6. Governance and Transparency (25)

9.6.1. Availability of the Institutional Strategic Plan and its Effective Implementation and Monitoring (10)

(Provide details of the Institute's strategic plan or Institutional Development Plan (IDP), its approval by the competent authority, and its implementation.)

Criterion 9: Student Support System and Governance (120)

9.6.2. Governing Body, Administrative Setup, Functions of Various Bodies, Service Rules, Recruitment procedures and Promotion Policies (10)

(Provide details of statutory and non-statutory administrative committees like the Governing body, Academic Council/ Senate, Grievance redressal Committee, IQAC, Anti-Raging committee, Disciplinary committee in place; Internal Complaints Committee (Women harassment mitigation committee) etc., provide the approval of these committees along with details of members, the meetings details (meeting notice, agenda, minutes, action taken etc. The service rules, policies and procedures; year of publication are to be listed.)

Criterion 9: Student Support System and Governance (120)

9.6.3. Transparency (05)

(Information on policies, rules, processes, delegation of financial powers, faculty, students, etc., and dissemination of this information to stakeholders should be made available on the Institute's website. Agendas and minutes of the Governing Body, Academic Council, and Senate are also required to be uploaded on the Institute's website. Additionally, state the extent of awareness among the stakeholders.)

Criterion 9: Student Support System and Governance (120)

9.7. Budget Allocation, Utilization, and Public Accounting at Institute Level (12)

(Provide a summary of the financial year's budget and actual expenditure incurred exclusively for the institution in the three financial years: CFYm1, CFYm2, and CFYm3. If the management oversees multiple Institutions, exclusive audited records for each Institute must be provided and made available on the Institute's website. The budget should be approved by the Institute BoG/GB/GC before the start of the financial year.)

CFY=Current Financial Year.

CFYm1=Current Financial Year Minus 1.

CFYm2=Current Financial Year Minus 2.

CFYm3=Current Financial Year Minus 3.

Criterion 9: Student Support System and Governance (120)

For CFYm1

Table No. 9.7.1: Summary of budget and actual expenditure incurred at Institute level for CFY m1.

Total Income in the CFYm1				Actual expenditure in the CFYm1	Total Students in the institute	Expenditure per student in CFYm1:
Fee	Govt.	Grants	Other Sources (specify)			

Note:

- Similar tables are to be prepared for CFYm2 & CFYm3.
- Audited statements for CFYm2, and CFYm3 are to be uploaded on the website

Criterion 9: Student Support System and Governance (120)

Table No. 9.7.2: Budget and actual expenditure incurred at Institute level.

Items	Budgeted in CFY	Actual expenses in CFY (till ...)	Budgeted in CFYm1	Actual Expenses in CFYm1	Budgeted in CFYm2	Actual Expenses in CFYm2	Budgeted in CFYm3	Actual Expenses in CFYm3
Infrastructure Built-Up								
Library								
Laboratory equipment								
Teaching and non-teaching staff salary								
Outreach Programs								
R&D								

Criterion 9: Student Support System and Governance (120)

9.8. Program Specific Budget Allocation, Utilization (08)

(Total budget at program level: CFYm1, CFYm2 & CFYm3

CFY=Current Financial Year.

CFYm1=Current Financial Year Minus 1.

CFYm2=Current Financial Year Minus 2.

CFYm3=Current Financial Year Minus 3.)

For CFYm1 (Similar table to be prepared for CFYm2 and CFYm3)

Table No. 9.8.1: Summary of budget and actual expenditure incurred at program level.

Total Budget in CFYm1:		Actual expenditure in CFYm1:		Total No. of students in CFYm1:
Demanded	**Actual Allocated**	**Actual Expenditure**	**% Spent**	**Expenditure per student**

Note: Justification and process of budgeting to be listed.

Criterion 9: Student Support System and Governance (120)

9.9. Quality of Learning Resources (Hard/Soft) (05)

(Provide details of available learning resources, including e-resources (books and journals), as well as information on the accessibility of these resources to students. Additionally, describe the support provided to students for self-learning activities.)

9.10. E-Governance (05)

(E-governance initiatives, sustainable practices in academic and learning management, campus-wide computing resources, and their accessibility and availability to support academic and professional activities for students and faculty.)

Criterion 9: Student Support System and Governance (120)

9.11. Initiatives and Implementation of Sustainable Development Goals (SDGs) (10)

(Provide details of initiatives taken towards implementation of SDG specifically on green energy, waste management, preserving water, net zero, quality education, reuse, recycle, less use to renewables, etc. Provide evidences on implementation (projects assigned, R & D activities, entrepreneurial activities, outreach programs etc.)

9.12. Innovative Educational Initiatives and Implementation (05)

(Provide details of initiatives taken towards mobility of students, implementation of academic bank of credits, and support for holistic education including human values, multidisciplinary/interdisciplinary curriculum/programs, initiatives on Indian Knowledge System, Contribution towards and implementation of teaching in Indian language, etc. Policies on inclusivity and equity and their implementation, support for economically, socially and physically challenged students. Action plan and its implementation for slow learners.)

Criterion 9: Student Support System and Governance (120)

9.13. Faculty Performance Appraisal and Development System (FPADS) (10)

(Faculty members of Higher Educational Institutions today have to perform a variety of tasks pertaining to diverse roles. In addition to instruction, faculty members need to innovate and conduct research for their self-renewal, keep abreast of changes in technology, and develop expertise for the effective implementation of curricula. They are also expected to provide services to the industry and community to understand and contribute to solving real-life problems in industry. Another role involves shouldering administrative responsibilities and cooperating with other faculty, heads of departments, and the head of the institute. An effective performance appraisal system for faculty is vital for optimizing the contribution of individual faculty to institutional performance. The assessment is based on a well-defined system for faculty appraisal for all the assessment years and its implementation and effectiveness.)

9.14. Outreach Activities (05)

(Provide details of outreach activities such as community service, Unnat Bharat Abhiyan, social internship and society connect activities undertaken by the students and their achievements.)

SAR 24: SomeChanges to Note :

- Alignment of Knowledge Profiles
- Ascertain Complex Engineering Problems /activities as per definition of IEA..
- Sustainability issues to be addressed while solving CEP
- Develop measurement tools (Rubrics) for Labs, PBL, Projects, Seminars carefully targeting the corresponding POs.
- Identify the courses/AATs which can be used to address SDGs apart from projects and keep a portfolio of evidences for those batch of students if possible..
- Concept of allied department and faculty requirement for SFR, Cadre proportion and retention ratio computations.
- Faculty contributions new criteria
- There is no separate first year criteria
- 11 POs by NBA
- 9 criteria in SAR

THANK YOU !