# AMITY UNIVERSITY

Outcome Assessment Plan

Domain:	Engineering & Technology
Institution:	Amity School of Engineering & Technology
Date:	1st July 2019

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# **SECTION I**

# **INTRODUCTION TO DOMAIN**

The Science and engineering education system in India has witnessed rapid progress in recent years to become one of largest in the world. Considering the wide diversities in the system and the need to enhance its *quality, standard and relevance* so that the *Science, Engineering* & *Technology* graduates passing out from the system can meet the global challenges of 21<sup>st</sup> century ahead of them.

There are a number of challenges being faced by science and engineering professionals in the on-going  $21^{st}$  century, recognized as the *Knowledge Age*, like:

1) Rapidly changing technological scene worldwide, with a shrinking time scale for new developments and for obsolescence of old practices, leading to:

- □ Increase in investment on R&D in industry and other sectors;
- Demand for innovative products and services, based on contemporary technologies; and,
- Growing need for enhancement of abilities to manage change, so frequent, now a days;

2) Globalization and liberalization of Indian industry, leading to:

- □ Comprehensive restructuring of industry sector for enhancing efficiency;
- □ Increase in world-wide mobility of *Science*, *Engineering* & *Technology* professionals; and,
- Growth of competitive environment globally and also in the country;
- 3) Emergence of new career opportunities for Science, Engineering & Technology professionals, leading to:

- Demand for broad-based, flexible education in multi/inter- disciplinary subjects;
- Emphasis on PG courses, research training and institute-industry interaction; and,
- Advances in learner-centric programmes and life-long learning opportunities;
- 4) Penetration of IT in all sectors of the Science, Engineering & Technology profession, leading to:
- □ Increased demand for IT-based solutions to industrial and societal problems;
- □ Expertise in emerging IT developments to solve complex, *Science, Engineering & Technology* problems; and,
- □ Improved access to worldwide information/data bases and *knowledge* centers.
- 5) Increased social/environmental concerns in the Science, Engineering & Technology context, leading to:
- Effective means for protection of endangered environment and depleting energy sources;
- Seeking environment- and energy- friendly solutions to *Science, Engineering & Technology* problems; and.
- □ Wealth generation using environmentally benign and energy efficient techniques;

These challenges require appropriate orientation of *Science, Engineering & Technology* education and research in the country at all levels, particularly at PG. Further the industrial needs are changing while the global environment of Science & Engineering education around the world is witnessing huge changes in education. In the era of globalization, national boundaries are vanishing. The Science & Engineering institutions need to benchmark their curriculum with the best institutions in the world and seek accreditation from National and International accreditations for recognition and mobility of students. Consequently, the All India Council of Technical Education (AICTE), University Grants Commission (UGC), NAAC, NBA and Knowledge Commission have been continuously rethinking on the modifications / improvements in the curriculum

structure of various programmes of higher education at large. UGC has formulated Choice Based Credit System (CBCS) for higher education in 2009, which has been adopted by many of the Universities /institution in the country.

Amity University is continuously striving for excellence in education. It is therefore, important to review and upgrade the curriculum of Bachelors Programmes in Science Engineering & Technology in line with the norms of UGC, National and International Accreditation bodies such as NAAC, ABET, IET, WASC, Global Benchmarking, industry and other stakeholders' feedbacks. After a series of discussions and deliberations with concerned groups, model framework/Programme structure and implementation guidelines for Bachelor's programme in Science, Engineering and Technology domain have been evolved in line with the requirements of UGC / AICTE, National & international Accreditation bodies and industry requirements. *Model Framework /Programme Structure and Scheme of Instructions* would be of help to the institutions offering Bachelor's programme in Science, Engineering & Technology domain *to* finalize the FETailed programme structure, syllabus and CBCS of various programmes of study.

#### Approach to Curriculum:

As a major objective of Bachelor's programme in Science, Engineering and Technology domain is to lay special emphasis on educating/preparing the students well for being able to demonstrate the following abilities:

- (a) Effective application of *knowledge* of mathematics, science and technical subjects;
- (b) Planning and design to conduct scientific and technical experiments;
- (c) Analysis and interpretation of scientific, technical and economic data collected;
- (d) Design of parts, subsystems, systems and/or processes to meet specific needs;
- (e) Identification, formulation and solving of problems using simulation or otherwise;

- (f) Use of techniques/tools including software in all disciplines, as may be required;
- (g) Effective communication skills and leadership/participation in team work;
- (h) Fulfillment of professional, social and ethical responsibilities;
- (i) Sensitivity to environmental and energy issues and concerns;
- (j) Planning, development and implementation of strategies for life-long learning.

These requirements call for the following objectives to the *Approach to Curriculum* relating to *Bachelor's programme in Science, Engineering and Technology Degree* in the country:

1) *Preparation:* To prepare the students to excel in various educational programmes or to succeed in industry / technical profession through further education/training;

2) *Core Competence:* To provide the students with a solid foundation in mathematical, Science, Engineering & Technology fundamentals required to solve Science, Engineering and Technology related problems;

3) *Breadth:* To train the students with a breadth of Science, Engineering and Technology knowledge to comprehend, analyze, design & create novel products and solutions for real life problems;

4) *Professionalism:* To inculcate in the students professional/ethical attitude, effective team work skills, multidisciplinary approach and to relate Science, Engineering and Technology issues to a broader context;

5) *Learning Environment:* To provide the students with academic environment of excellence, leadership, ethical guidelines and life-long learning needed for a long/productive career.

Amity University is continuously striving for excellence in education. It is therefore, important to review and upgrade the curriculum of Programmes in line with the ever changing requirements of industry /profession based on stakeholders' feedbacks. Amity University Offers Outcome Based Education (OBE) with Flexi Choice Based Credit System (CBCS) by benchmarking its programmes with best universities globally. UGC has formulated Choice Based Credit System (CBCS) for higher education in 2009, which have been further modified in 2014 to be adopted by the Universities /institution in the country.

## **SECTION II**

## INTRODUCTION OF OUTCOME ASSESSMENT PLAN

#### **Outcomes Assessment**

Outcomes assessment is a systematic, evaluative process that is implemented to secure learning experiences that are congruent with original goals and objectives; thereby providing a basis for the effectiveness and continuous quality improvement of the academic unit.

- 1) The annual **outcome assessment** process is more **qualitative** and focuses on improving teaching by **analyzing student learning outcomes**.
- 2) The programme **review process** is more **quantitative** and focuses on the programme/discipline as a whole, how effective it is, and that our students are learning.
- 3) To achieve the above, some aspect of each programmes goals and objectives needs to be assessed on an annual basis.
- 4) All programme and general education goals shall be evaluated annually

The outcome assessment plan includes:

- **1. Mission** The Mission is defined for the domain which flows down to the Institution level and finally to the programme level. The mission at the institution and programme level is aligned with the domain mission
- 2. Broad Based Goals: The broad based are defined under the following categories:
- **2.1 Educational Goals:** The Educational Goals are defined at Domain, Institution and Programme level. The Educational Goals at the institution and programme level are aligned with the domain mission.
- **2.2 Operational Goals:** The Operational Goals are defined at Domain, Institution and Programme level. The Operational Goals at the institution and programme level are aligned with the domain mission.
- 3. Outcomes: The Outcomes are defined under the following categories:
- 3.1 Operational Outcomes: The operational outcomes are defined for the domain and assessed at the domain level
- **3.2 Educational Goals The** Learning outcomes are defined for each programme and each learning outcome is assessed to identify that the established learning objectives are achieved.
- 4. Mapping of PEOs and PLOs The relationship of PEOs and PLOs are clearly indicated through the mapping of learning outcomes with the established Objective. Each outcome addresses some objective and achievement of outcome indicates the attainment of Objective
- 5. Assessment of Learning and Operational Outcomes Each learning outcome is assessed by at least one direct and one indirect method. Similarly Operational outcomes are also assessed using the operational assessment tools. It also ensures that outcomes achieved are consistent with the mission. The results of the annual assessments and other data are used to FETermine the effectiveness of the programme during the programme review process.
- 6. Programme Review: Through the review of our programmes we seek to demonstrate that:
  - Students are **learning** the knowledge, skills, and habits necessary to achieve the programme/discipline goals and objectives

- The **programme/discipline goals** are derived from and support the college mission
- The **curriculum** is coherent, current and consistent
- The **instruction** is effective in enabling student
- The **resources** are adequate for the production of student learning.
- The academic **support services** are adequate to facilitate student learning.

## SECTION III

## DOMAIN MISSION AND BROAD-BASED GOALS /OBJECTIVES

Faculty of Engineering & Technology (FET)

**Section I: Mission and Broad-Based Goals** 

### 3.1 Mission Statement

#### **Mission Statement:**

"To provide education at all levels in all disciplines of Engineering and Technology and in the futuristic and emerging frontier areas of knowledge, learning and research and to develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals, with understanding and regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

## **3.2. Broad-Based Educational Goals**

Broad-B	Broad-Based Student Educational Goals:	
1.	Students shall be able to illustrate knowledge of theory and concepts of Engineering & Technology in a professional work setting	
2.	Students shall be able to interpret, examine, formulate, design and create novel products and solutions for real life problems	
3.	Students shall be able to relate Engineering issues to the broader social, legal, cultural and environmental contexts	
4.	Students shall be able to demonstrate effective performance by leveraging Information and Technological competencies in the professional/entrepreneurial careers	
5.	Students shall be able todemonstrate professional attitudes, effective communication and behavioral skills that support and improve individual's performance	
6.	Students shall be able tocreate technical competence for successful and productive careers or advance studies/research in the field of Engineering & Technology	
7.	Students shall be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and in managing projects.	
8.	Students will be able to critically examine and utilize learning throughout their career	

## **3.3 Broad-Based Operational Goals**

S.No	Operational Goals
1	FET will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	FET will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	FET will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	FET will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	FET will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	FET will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	FET will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	FET will create opportunities for international exposure for its students and faculty.

Amity School of Engineering & Technology (ASET)

SECTION IV

## INSTITUTION MISSION AND BROAD-BASED GOALS /OBJECTIVES

## Name of the Institution: AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY

4.1 Mission Statement

## **Mission of Institution**

"To provide education at all levels in various disciplines of Engineering and Technology and in the futuristic and emerging frontier areas of knowledge, learning and research and to develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals, with understanding and regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action".

4.2 Broad-Based Goals / Objectives at Institution Level

Broad-	Broad-Based Student Learning Goals at Institutional Level:	
1.	Students shall be able to illustrate knowledge of theory and concepts of Engineering & Technology in a professional work setting	
2.	Students shall be able to interpret, examine, formulate, design and create novel products and solutions for real life problems	
3.	Students shall be able to relate Engineering issues to the broader social, legal, cultural and environmental contexts	
4.	Students shall be able to demonstrate effective performance by leveraging Information and Technological competencies in the professional/entrepreneurial careers	
5.	Students shall be able to demonstrate professional attitudes, effective communication and behavioral skills that support and improve individual's performance	
6.	Students shall be able to create technical competence for successful and productive careers or advance studies/research in the field of Engineering & Technology	
7.	Students shall be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and in managing projects.	
8.	Students will be able to critically examine and utilize learning throughout their career	

## 4.3 Broad-Based Operational Goals (Resources Required) At Institution level

S.No	Operational Goals
1	ASET will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	ASET will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	ASET will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	ASET will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	ASET will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	ASET will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	ASET will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	ASET will create opportunities for international exposure for its students and faculty.

Section V

Programme Mission, PEO's, PLO's and Assessment Plan for each Programme

#### 5. 1 Bachelor's-Level Programme -

B.Tech.(Computer Science & Engineering),

**B.Tech (Computer Science & Engineering – Evening)** 

## **5.1.1 Mission Statement**

#### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Computer Science & Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

#### **5.1.2 Programme Educational Objectives (PEOs)**

Programme Educational Objectives

1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products/ solutions as per industry and societal requirements.

2. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.

3. The students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur.

4. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers.

5. The student will have the ability to support and practice independent and life-long learning for professional development.

## 5.1.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

## **5.1.4 Programme Learning Outcomes**

Programme Learning Outcomes

1. The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of computer science & engineering.

2. The student will identify, formulate research literature and analyze computer science & engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. The student will create solutions for computer science & engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations.

4. The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

5. The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for computing practices as per the Industrial trends with an understanding of the limitations.

6. The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.

7. The student will recognize the impact of the professional engineering solutions in political, economic, global, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development.

8. The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.

9. The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.

10. The student will use effective communication to cater to both technical and non-technical audiences.

11. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.

12. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change and contemporary issues.
# 5.1.5 Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

### 5.1.6 PEO's – PLO mapping

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs). The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summarizes of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{ in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):$ 

Broad-Based Student Learning Goals (PEOs) Programme Learning Outcome (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
BACHELOR'S LEVEL PROGRAMS					
B.TECH					
Learning Outcome 1					
Learning Outcome 2	$\checkmark$				
Learning Outcome 3					
Learning Outcome 4					
Learning Outcome 5	$\checkmark$				
Learning Outcome 6		$\checkmark$			
Learning Outcome 7		$\checkmark$			
Learning Outcome 8			$\checkmark$		
Learning Outcome 9					
Learning Outcome 10					

Broad-Based Student Learning Goals (PEOs) Programme Learning Outcome (PLOs)	DEO	PEO 2	PEO 3	PEO 4	PEO 5
Programme Learning Outcome (FEOS)					
Learning Outcome 11				V	
Learning Outcome 12					

# 5.1.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will apply knowledge of mathematics, sciences and engineering to solve problems	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		using concepts of computer science & engineering	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, formulate research literature and analyze computer	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		science & engineering problems reaching substantiated	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

		conclusions using first principles of mathematics, natural sciences, and engineering sciences						grade 'A' or above
3	Design/Development of Solutions	The student will create solutions for computer science & engineering problems and design system	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		components or processes that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

4	Problem Analysis	The student will carry out investigations of problems using research-based knowledge and research methods	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	The student will create, select and apply appropriate techniques,	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		resources and modern engineering and IT tools, necessary for computing practices as	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

		per the Industrial trends with an understanding of the limitations.						Ad
6	The Engineer & Society	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		cultural issues and consequent responsibilities relevant to the professional engineering practice	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health,

								and cultural issues
7	Environment & Sustainability	The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and	Comprehensive Examination Major Project Rubrics	UG/PLO/D/CE UG/PLO/D/P2	Atleast 20% of the students shall obtain grade 'A' (>=75-100%) Atleast 40%	Student Exit Survey	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40%
		demonstrate the knowledge if and need for the sustainable development			of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues

8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall have plagiarism 15% or below	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%) 100% of the students shall have plagiarism
			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)			15% or below
			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% of the students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% of the students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)

		undertake a common goal in multidisciplinary settings	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
			Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above			
10	Communication	The student will use effective communication to cater to both technical and non-technical audiences	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% of the students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

			Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)			
11	Project Management & Finance	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade <sup>•</sup> A' (>=75- 100%)
		apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students	Industry Internship	UG/PLO/ID/II	Atleast 40% of the

of technological change			shall obtain a grade 'A' or above			students shall obtain a grade 'A' or above
	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

#### **5.2.1 Mission Statement**

#### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Computer Science & Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

### **5.2.2 Programme Educational Objectives (PEOs)**

Programme Educational Objectives

- 1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products through research and provide solutions as per industry and societal requirements.
- 2. The students shall have the ability to apply research knowledge and methods to solve engineering problems
- 3. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.
- 4. Students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/leader in diverse teams and as an entrepreneur
- 5. The student will have the ability to support and practice independent and life-long learning for professional development.
- 6. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers

# 5.2.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme of B.Tech CSE will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

### 5.2.4 Programme Learning Outcomes

1.	The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of computer science &
	engineering.
2.	The student will identify, formulate research literature and analyze computer science & engineering problems reaching substantiate conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	The student will create solutions for computer science & engineering problems and design system components or processes that mee
	the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmenta considerations.
4.	The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions
5.	The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for computing practice as per the Industrial trends with an understanding of the limitations.
6.	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues an consequent responsibilities relevant to the professional engineering practice.
7.	The student will recognize the impact of the professional engineering solutions in political, economic, global, societal an environmental contexts and demonstrate the knowledge if and need for the sustainable development.
8.	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.
	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goa in multidisciplinary settings.
10	. The student will use effective communication to cater to both technical and non-technical audiences.
11	. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
12	. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technologic change and contemporary issues

# 5.2.5 Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

### 5.2.6 PEO's – PLO mapping

Broad-Based Student Learning PEO Goals (PEQs) 6 PEO PEO PEO PEO PEO Intended 2 3 1 4 5 Student Learning Outcomes (SLOs) **MASTER'S LEVEL PROGRAMS** *Name of the programme* Learning Outcome 1  $\sqrt{}$  $\sqrt{}$ Learning Outcome 2  $\sqrt{}$  $\sqrt{}$ Learning Outcome 3  $\sqrt{}$  $\sqrt{}$ Learning Outcome 4  $\sqrt{}$  $\sqrt{}$ Learning Outcome 5  $\sqrt{}$  $\sqrt{}$ Learning Outcome 6  $\sqrt{}$ Learning Outcome 7  $\sqrt{}$ 

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs). The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summarizes of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{in a given cell of the table indicates the intended learning goal in that row is associated with the learning goal in that column.):$ 

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
Learning Outcome 8						
Learning Outcome 9						
Learning Outcome 10					V	
Learning Outcome 11					V	
Learning Outcome 12						

# 5.2.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will apply knowledge of mathematics, sciences and engineering to solve problems	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		using concepts of computer science & engineering	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked "Satisfactory"	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, formulate research literature and analyze computer	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		science & engineering problems reaching substantiated	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked "Satisfactory"	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

		conclusions using first principles of mathematics, natural sciences, and engineering sciences						grade 'A' or above
3	Design/Development of Solutions	The student will create solutions for computer science & engineering problems and design system	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		components or processes that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked "Satisfactory"	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

4	Problem Analysis	The student will carry out investigations of problems using research-based knowledge and research methods	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked "Satisfactory"	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	The student will create, select and apply appropriate techniques, resources and modern engineering and	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade <sup>•</sup> A <sup>•</sup> (>=75- 100%)
		IT tools, necessary for computing practice as per the Industrial trends with an understanding	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked "Satisfactory"	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

		of the limitations						
6	The Engineer & Society	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
	cultural issues and consequent responsibilities relevant to the professional engineering	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked 'satisfactory' 100% of the	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above	
		practice			students shall pursue their responsibility towards environment, society, ethics,			100% of the students shall pursue their responsibility towards environment,
					health, safety, legal and cultural issues			society, ethics, health, safety, legal

								and cultural issues
7	Environment & Sustainability	The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and	Comprehensive Examination Dissertation Rubrics	UG/PLO/D/CE UG/PLO/D/DN	Atleast 40% of the students shall obtain grade 'A' (>=75-100%) Atleast 80%	Student Exit Survey	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40%
		demonstrate the knowledge if and need for the sustainable development			of the students shall be marked 'Satisfactory' 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues

8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked 'Satisfactory' 100% of the students shall have plagiarism 15% or below	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%) 100% of the students shall have
			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)			plagiarism 15% or below
			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% of the students shall qualify the exams	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% of the students shall pass the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)

		undertake a common goal in multidisciplinary settings	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked "Satisfactory"			
10	Communication	The student will use effective communication to cater to both technical and non-technical audiences	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% of the students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked "Satisfactory"	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

			Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)			
11	ProjectThe student willManagement &demonstrateFinanceknowledge andunderstanding ofthe engineeringand managementprinciples andapply these tofor the engineering	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)	
		apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked "Satisfactory"	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students	Industry Internship	UG/PLO/ID/II	Atleast 40% of the

of technological		shall be		students shall
change		marked		obtain a
		"Satisfactory"		grade 'A' or
				above

### 5.3. B.Tech.(Information Technology)

### **5.3.1 Mission Statement**

### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Information Technology as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

#### **5.3.2 Programme Educational Objectives (PEOs)**

Programme Educational Objectives

1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products/ solutions as per industry and societal requirements.

2. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.

3. The students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur.

4. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers.

5. The student will have the ability to support and practice independent and life-long learning for professional development.

#### 5.3.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

# 5.3.4 Programme Learning Outcomes

Program	Programme Learning Outcomes							
1.	The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Computer Science & Information Technology							
2.	The student will identify, formulate research literature and analyse Computer Science & Information Technology problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.							
3.	The student will create solutions for computing problems and design and administer system components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations.							
4.	The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions							
5.	The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for computing practice as per the Industrial trends with an understanding of the limitations.							
6.	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.							
7.	The student will recognize the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts to demonstrate the knowledge and the need for the sustainable development.							
8.	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.							
9.	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.							
10.	The student will use effective communication to cater to both technical and non-technical audiences.							
11.	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects effectively in multidisciplinary environments.							
12.	The student will recognise the need to engage in independent and life-long learning in the broadest context of technological change and contemporary issues.							

# 5.3.5 Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.

#### **Operational Outcomes**

12 The faculty will support all the students for quality placements or join family business or start their own venture.

### 5.3.6 PEO's – PLO mapping

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs) The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{$  in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):

S	Broad-Based Student Learning Goals (PEOs) Intended Programme Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
	BACHELOR'S LEVEL PROGRAM	IS				
	Name of the programme: B.Tech (Infor	mation T	echnolog	gy)		
	Learning Outcome 1					

Broad-Based Student Learning Goals (PEOs) Intended Programme Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
Learning Outcome 2					
Learning Outcome 3					
Learning Outcome 4					
Learning Outcome 5	$\checkmark$				
Learning Outcome 6		$\checkmark$			
Learning Outcome 7					
Learning Outcome 8			V		
Learning Outcome 9					
Learning Outcome 10					
Learning Outcome 11					
Learning Outcome 12					λ

# 5.3.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will apply knowledge of mathematics, sciences and engineering to solve problems	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		using concepts of Computer Science & Information Technology	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, formulate research literature and analyse Computer	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		Science & Information Technology problems reaching	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

		substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences						grade 'A' or above
3	Design/Development of Solutions	The student will create solutions for computing problems and design and administer system components or processes that	Comprehensive Examination Major Project Rubrics	UG/PLO/D/CE UG/PLO/D/P2	Atleast 20% of the students shall obtain grade 'A' (>=75-100%) Atleast 40% of the students	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75-100%) Atleast 40% of the
		meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations			shall obtain a grade 'A' or above			students shall obtain a grade 'A' or above

4	Problem Analysis	The student will carry out investigations of problems using research-based knowledge and research methods	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	The student will create, select and apply appropriate techniques, resources and modern engineering and	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		IT tools, necessary for computing practice as per the Industrial trends with an understanding	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
		of the limitations.						
---	---------------------------	--	------------------------------	-------------	---	------------------------	------------------	--
6	The Engineer & Society	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		cultural issues and consequent responsibilities relevant to the professional engineering	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
		practice.			students shall pursue their responsibility towards environment, society, ethics,			100% of the students shall pursue their responsibility towards environment,
					health, safety, legal and cultural issues			society, ethics, health, safety, legal

								and cultural issues
7	Environment & Sustainability	The student will recognize the impact of the professional engineering solutions in political, global, economic, societal and	Comprehensive Examination Major Project Rubrics	UG/PLO/D/CE UG/PLO/D/P2	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40%
		environmental contexts to demonstrate the knowledge and the need for the sustainable development.			of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues

8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall have plagiarism 15% or below	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade A' (>=75- 100%) 100% of the students shall have plagiarism
			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)			15% or below
			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)

		undertake a common goal in multidisciplinary settings	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
			Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above			
10	Communication	The student will use effective communication to cater to both technical and non-technical audiences.	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

			Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)			
11	Project Management & Finance	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade A' (>=75- 100%)
		one's own work, as a member and leader in a team as well as to manage projects effectively in multidisciplinary environments.	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	The student will recognise the need to engage in independent and life-long learning in the broadest context of technological	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		change and	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students	Industry Internship	UG/PLO/ID/II	Atleast 40% of the

	contemporary			shall obtain a			students shall
	issues.			grade 'A' or			obtain a
				above			grade 'A' or
							above
		Major Project Rubrics	UG/PLO/D/P2	Atleast 40%	Industry Internship	UG/PLO/ID/ II	Atleast 40%
			0 0/1 20/2/12	of the students	mousely morning	0 0/1 20/12/ 11	of the
				shall obtain a			students shall
				grade 'A' or			obtain a
				above			grade 'A' or
							above

### 5. 4 Master's-Level Programme - M.Tech.(Computer Network & Information Security)

#### **5.4.1 Mission Statement**

Program	nme	Mis	sion					

"To provide education in the futuristic and emerging frontier areas of Computer Network & Information Security as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

### 5.4.2 Programme Educational Objectives (PEOs)

1	The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative
1.	products through research and provide solutions as per industry and societal requirements.
2	
	The students shall have the ability to apply research knowledge and methods to solve engineering problems
3.	The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural a environmental contexts.
4.	Students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team memb leader in diverse teams and as an entrepreneur
5.	The student will have the ability to support and practice independent and life-long learning for professional development.
6.	Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effect performance in the professional/entrepreneurial careers

## 5.4.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

## 5.4.4 Programme Learning Outcomes

1.	Student will effectively apply knowledge of mathematics, applied sciences and engineering to solve complex problems
2.	Student will identify, analyze research literature and formulate <b>Computer Network &amp; Information Security</b> problem reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	Student will create solutions for complex <b>Computer Network &amp; Information Security</b> problems and design syste components or processes that meet the specifications with appropriate consideration for the public health and safety, a the cultural, societal, and environmental considerations.
4.	Student will carry out investigations of complex problems using research-based knowledge and research methor including design of experiments, analysis and interpretation of data, and synthesis of the information to provide vaconclusions.
5.	Student will create, select, and apply appropriate techniques, resources, and modern engineering and IT tools include prediction and modeling to different computer science & engineering activities as per the Industrial trends with understanding of the limitations
6.	Student will apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultu issues and the consequent responsibilities relevant to the professional engineering practice.
7.	Student will recognize the impact of the professional <b>Computer Network &amp; Information Security</b> solutions in soci and environmental contexts and demonstrate the knowledge of and need for the sustainable development.
8.	
9.	Student will demonstrate effectiveness as an individual and as a member or leader in teams and in multidisciplin settings.
10	. Student will use effective communication to cater to both technical and non-technical audiences.
11.	. Student will demonstrate knowledge and understanding of the engineering and management principles and apply thes one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
12.	Student will recognise the need for and will engage in independent and life-long learning in the broadest contex technological change.

## 5.4.5 **Programme Operational Outcomes**

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.

Op	erational Outcomes
12	The faculty will support all the students for quality placements or join family business or start their own venture.

### 5.4.6 PEO's – PLO mapping

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs)

The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{$  in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):

Broad-Based Student Learning Goals (PEQs) Intended Programme Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
MASTER'S LEVEL PROGRAM	S					
Name of the programme						
Learning Outcome 1						

Broad-Based Student Learning Goals (PEQs) Intended Programme Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
Learning Outcome 2		$\checkmark$				
Learning Outcome 3	V	$\checkmark$				
Learning Outcome 4	$\checkmark$	$\checkmark$				
Learning Outcome 5		$\checkmark$				
Learning Outcome 6			$\checkmark$			
Learning Outcome 7			$\checkmark$			
Learning Outcome 8						
Learning Outcome 9						
Learning Outcome 10					V	
Learning Outcome 11					$\checkmark$	

Broad-Based Student Learning Goals (PEQs) Intended Programme Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
Learning Outcome 12						

## 5.4.7 Student Learning Assessment for <u>M.Tech.(Computer Network & Information Security</u>)

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge Student will effectively apply knowledge of mathematics, applied sciences and engineering to solve complex	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)	
		problems.	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, analyze research literature and formulate Computer	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade <sup>•</sup> A' (>=75-100%)

		Network & Information Security problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
3	Design/Development of Solutions	The student will create solutions for complex Computer Network & Information Security problems and design system components	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		or processes that meet the specifications with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
4	Problem Analysis	The student will carry out investigations of complex problems using research-based	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a

		knowledge and research methods including design of experiments, analysis and interpretation of			'A' (>=75- 100%)			grade'A' (>=75-100%)
	data, and synthesis of the information to provide valid conclusions.	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above	
5	Modern Tool Usage	The student will create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		and modeling to different computer science & engineering activities as per the Industrial trends with an understanding of the limitations	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

6	The Engineer & Society	The student will apply reasoning informed by the contextual	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a
		knowledge to assess societal, health, safety, legal, and			'A' (>=75- 100%)			grade'A' (>=75-100%)
		cultural issues and the consequent responsibilities relevant to the professional engineering practice.	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues
7	Environment & Sustainability	Student will recognize the impact of the professional Computer Network & Information Security solutions in societal and environmental	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)

r		contexts and	Discussion D 1		A (1	To 1 of a Take of 1		A (1
		demonstrate the	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80%	Industry Internship	UG/PLO/ID/ II	Atleast 40%
		knowledge of and			of the			of the
		need for the			students shall			students shall
		sustainable			be marked			obtain a grade
		development.			satisfactory or			'A' or above
					above			
								100% of the
					100% of the			students shall
					students shall			pursue their
					pursue their			responsibility
					responsibility			towards
					towards			environment,
					environment,			society,
					society,			ethics, health,
					ethics, health,			safety, legal
					safety, legal			and cultural
					and cultural			issues
					issues			155005
					155005			
8	Ethics	The student will	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
		apply ethical			of the			of the
		principles and			students shall			students shall
		demonstrate professional ethics,			be marked			give a
		responsibilities and			satisfactory or			grade'A'
		norms of the			above			(>=75-100%)
		engineering practice.			above			(>=75-10070)
					100% of the			100% of the
					students shall			students shall
					have			have
					plagiarism			plagiarism
					15% or below			15% or below
					15% OI DEIOW			15% OF DEIOW
				l		l		

			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 40% of the students shall obtain grade 'A' (>=75-			
			Behavioural Science Rubrics	UG/PLO9/D/BS	100%) Atleast 85% students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader in teams and in multidisciplinary settings.	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		seeings.	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
					'A' (>=75- 100%)			

			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory			
10	Communication	The student will use effective communication to cater to both technical and non-technical audiences.	Business Communication Rubrics Dissertation Rubrics	UG/PLO10/D/ BC UG/PLO/D/DN	Atleast 85% students shall qualify the exam Atleast 80% of the students shall be marked satisfactory	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/II	Atleast 85% of the students shall give a grade'A' (>=75-100%) Atleast 40% of the students shall obtain a grade 'A' or above
			Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)			

11	Project Management	The student will	Comprehensive Exam	UG/PLO/D/CE	Atleast 40%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
	& Finance	demonstrate			of the	Student Exit Survey		of the
		knowledge and			students shall			students shall
		understanding of			obtain grade			give a
		the engineering			'A' (>=75-			grade'A'
		and management			100%)			(>=75-100%)
		principles and			10070)			(* *** 100/0)
		apply these to						
		one's own work,						
		as a member and						
		leader in a team						
		as well as to						
		manage projects						
		in						
		multidisciplinary						
		environments.						
12	Lifelong Learning	The student will	Comprehensive Exam	UG/PLO/D/CE	Atleast 40%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
		recognise the			of the			of the
		need for and will			students shall			students shall
		engage in			obtain grade			give a
		independent and			'A' (>=75-			grade'A'
		life-long			100%)			(>=75-100%)
		learning in the				<b>x</b> 1 . <b>x</b> . 11		
		broadest context	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80%	Industry Internship	UG/PLO/ID/II	Atleast 40%
		of technological			of the			of the
		change.			students			students shall
					shall be			obtain a grade
					marked			'A' or above
					satisfactory			

#### 5. 5 Bachelor's-Level Programme - B.Tech.(Civil Engineering)

#### 5.5.1 Mission Statement

#### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Civil Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

#### 5.5.2 Programme Educational Objectives (PEOs)

Programme Educational Objectives

1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products/ solutions as per industry and societal requirements.

2. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.

3. The students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur.

4. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers.

5. The student will have the ability to support and practice independent and life-long learning for professional development.

## 5.5.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

## 5.5.4 Programme Learning Outcomes

Intended L	earning Outcomes
1.	The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Civil
	Engineering.
2.	The student will identify, formulate research literature and analyse Civil Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	The student will create solutions for engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations.
4.	The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions
5.	The student will create, select and apply appropriate techniques, resources and modern engineering and Civil Engineering tools, necessary for engineering practice as per the Industrial trends with an understanding of the limitations.
6.	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.
7.	The student will recognize the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development.
8.	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.
9.	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.
10	The student will use effective communication to cater to both technical and non-technical audiences.
11	. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
12	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change and contemporary issues

# 5.5.5 **Programme Operational Outcomes**

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.

Op	erational Outcomes
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

### 5.5.6 PEO's – PLO mapping

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs) The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{$  in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):

Broad-Based Program Learning Goals (PEQs) Intended Program Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
BACHELOR'S LEVEL PROGR	AMS				

Broad-Based Program Learning Goals (PEQs) Intended Program Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
Name of the programme: B.Tech					
Learning Outcome 1					
Learning Outcome 2					
Learning Outcome 3					
Learning Outcome 4					
Learning Outcome 5					
Learning Outcome 6		$\checkmark$			
Learning Outcome 7		$\checkmark$			
Learning Outcome 8					
Learning Outcome 9				$\checkmark$	

Broad-Based Program Learning Goals (PEQs) Intended Program Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
Learning Outcome 10					
Learning Outcome 11				V	
Learning Outcome 12					

## 5.5.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	PLO1	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75- 100%)
			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.
2	Investigation	PLO2	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75- 100%)

			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.
3	Design/Development of Solutions	PLO3	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75- 100%)
			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.

4	Problem Analysis	PLO4	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75- 100%)
			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.
5	Modern Tool Usage	PLO5	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75- 100%)

			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.
6	The Engineer & Society	PLO6	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75- 100%)
			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.
7	Environment & Sustainbility	PLO7	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75- 100%)
			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a

					grade 'A' or above			grade 'A' or above.
8	Ethics	PLO8	Plagiarism Checking of NTCC Report		100% Students are checked for plagiarism in NTCC report submissions and are allowed to appear for vivavoce upon obtaining plagiarism % below 15%.	Feedback of Industry Internship Guide	UG/PLO/ID/ II	60% students are rated between 4-5 range on the Likert Scale in the feedback by Industry guides.
			Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75- 100%)

9	Individual and Team Work	PLO9	Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 80% of the students shall pass the exam	Student Exit Survey	UG/PLO/ID/ ES	70% students response range between 4-5 on the Likert Scale in the Student Exit Survey.
						Alumni Survey	UG/PLO/ID/ AS	70% students response range between 4-5 on the Likert Scale in the Alumni Survey.

			Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75- 100%)	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade 'A' (>= 75- 100%)
			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above			40% of the students shall obtain a grade 'A' or above.
10	Communication	PLO10	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 80% of the students shall pass the exam	Student Exit Survey	UG/PLO/ID/ ES	70% students response range between 4-5 on the Likert Scale in the Student Exit Survey.
						Alumni Survey	UG/PLO/ID/ AS	70% students response range between 4-5 on the Likert Scale in the Alumni Survey.
			Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75- 100%)
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			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.
11	Project Management & Finance	PLO11	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75- 100%)
			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.

		C .1			
		of the			of the
		students shall			students shall
		obtain grade			give a grade
		'A' (>= 75-			'A' (>= 75-
		100%)			100%)
			'A' (>= 75-	'A' (>= 75-	'A' (>= 75-

5.6. BACHELOR'S-Level Programme -

# B.Tech Electronics & Communication Engineering B.Tech Electronics & Communication Engineering Evening

#### 5.6.1 Mission Statement

**Programme Mission** 

"To provide education in the futuristic and emerging frontier areas of Electronics & Communication Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

#### 5.6.2 Programme Educational Objectives (PEOs)

Programme Educational Objectives

1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products/ solutions as per industry and societal requirements.

2. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.

3. The students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur.

4. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers.

5. The student will have the ability to support and practice independent and life-long learning for professional development.

# 5.6.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme of B.Tech ECE will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs.
8	The Programme will create opportunities for international exposure for its students and faculty.

#### **5.6.4 Programme Learning Outcomes**

### Intended Learning Outcomes

1. The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Electronics and Communication Engineering.

2. The student will identify, formulate research literature and analyze Electronics and Communication Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. The student will create solutions for computer science & engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations.

4. The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

5. The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for computing practices as per the Industrial trends with an understanding of the limitations.

6. The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.

7. The student will recognize the impact of the professional engineering solutions in political, economic, global, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development.

8. The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.

9. The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.

10. The student will use effective communication to cater to both technical and non-technical audiences.

11. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.

12. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change and contemporary issues.

# 5.6.5Programme Operational Outcomes

Operat	tional Outcomes
1. Т	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2. 7	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global
S	standards by incorporating feedback from all the stakeholders.
3. Т	The student will graduate in timely manner.
4. 7	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5. 7	The student will earn achievements in inter-university Extra Curricular activities.
6. Т	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies
a	and to contribute to the existing Body of Knowledge.
7. 1	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8. 7	The faculty will facilitate cultivation of cross cultural humanitarian values.
9. 1	The faculty will facilitate joint research collaborations, invite international delegates and speakers for
S	seminars and conferences and various other opportunities for global exposure
10. 7	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve
p	prestigious accreditations from various national, international bodies and ranking bodies.
	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni
n	network and keep the curriculum responsive to industry needs.
12. 7	The faculty will support all the students for quality placements or join family business or start their own
V	/enture.

### 5.6.6 Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs)

The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{\text{ in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):$ 

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
BACHELOR'S LEVEL PROGR	AMS				
Name of the programme					
Learning Outcome 1					
Learning Outcome 2					
Learning Outcome 3					
Learning Outcome 4					

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
Learning Outcome 5	$\checkmark$				
Learning Outcome 6					
Learning Outcome 7					
Learning Outcome 8					
Learning Outcome 9					
Learning Outcome 10				$\checkmark$	
Learning Outcome 11				$\checkmark$	
Learning Outcome 12					

# 5.6.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will demonstrate the knowledge of mathematics, science, engineering	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		fundamentals, and domain knowledge in Electronics and Communication Engineering to the solution of complex engineering problems.	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will demonstrate an ability to identify, formulate, research	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)

		literature, and analyze complex engineering problems reaching substantiated conclusions using principles of mathematics, natural sciences, and engineering sciences with focus in Electronics and Communication Engineering.	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
3	Design/Development of Solutions	The student will demonstrate an ability to design	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)

	solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration public health and safety, economical, cultural, societal, and environmental considerations.	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
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4	Problem Analysis	The student will demonstrate the research- based knowledge and research	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		methods including design and conduct of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	The student will create, select, and apply appropriate techniques, resources, and	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)

		modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
6	The Engineer & Society	The student will be able to apply reasoning informed by the contextual knowledge to	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility

engineering		environment,		towards
practice.		society, ethics,		environment,
		health, safety,		society,
		legal and		ethics,
		cultural issues		health,
				safety, legal
				and cultural
				issues

Environment &	The student	Comprehensive	UG/PLO/D/CE	Atleast 20%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
		-			Student Exit Bull Vey		of the
Sustainaointy	will be able to	Examination					students shall
	understand the						give a
	impact of the			-			grade'A'
	-			<b>`</b>			(>=75-
	*			100%)			<b>`</b>
							100%)
	solutions in	Major Project Rubrics	LIG/PLO/D/P2	Atleast 10%	Industry Internship		Atleast 40%
	political,	Major Project Rubites	00/120/0/12		mediatry merinanip	00/120/10/11	of the
	-						students shall
	-						obtain a
				U			grade 'A' or
	societal and			A of above			above
	environmental			100% of the			above
	contexts. and						100% of the
	,						students shall
				-			pursue their
	e						responsibility
	of, and need for						towards
	sustainable						environment,
	development						society,
	development.						ethics,
							health,
				issues			safety, legal and cultural
							issues
	Environment & Sustainability	Sustainability Sustainability Will be able to understand the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts, and demonstrate the knowledge of, and need for	Sustainability will be able to understand the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable	Sustainability will be able to understand the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable	SustainabilityInto state in will be able to understand the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts, and demonstrate the knowledge of, and need for sustainableExaminationof the students shall obtain grade 'A' (>=75- 100%)Major Project RubricsUG/PLO/D/P2Atleast 40% of the students shall obtain a grade 'A' or above100% of the students shall economic, societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable100% of the students shall pursue their responsibility towards environment, society,	Sustainability will be able to will be able to understand the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. Examination Examination Examination Examination impact of the students shall obtain grade 'A' (>=75- 100%) UG/PLO/D/P2 Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural	Sustainability Final statum Examination of the students shall obtain grade 'A' (>=75-100%)   will be able to understand the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. Major Project Rubrics UG/PLO/D/P2 Atleast 40% of the students shall obtain a grade 'A' or above Industry Internship UG/PLO/ID/ II

8	Ethics	The student will	Major Project Rubrics	UG/PLO/D/P2	Atleast 40%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
		demonstrate	5 5		of the	5		of the
		ethical			students shall			students shall
		principles and			obtain a grade			give a
		• •			'A' or above			grade'A'
		commit to						(>=75-
		professional			100% of the			100%)
		ethics and			students shall			
		responsibilities			have			100% of the
		and norms of the			plagiarism			students shall
		engineering			15% or below			have
		practice.	Community F		A (1)	4		plagiarism
		-	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the			15% or
				Framework				below
					students shall			
					obtain grade 'A' (>=75-			
					< compared with the second sec			
					100%)			
			Behavioural Science	UG/PLO9/D/BS	Atleast 85%	Industry Internship	UG/PLO/ID/ II	Atleast 40%
			Rubrics		of the			of the
					students shall			students shall
					qualify the			obtain a
					exam.			grade 'A' or
								above
9	Individual and	The student will	Foreign Business	UG/PLO9/D/F	Atleast 85%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
7	Team Work		Language Rubrics	BL	of the	Student Exit Sulvey		of the
		be able to	Language Rubbles		students shall			students shall
		function			students shall			give a
		effectively as an						grade'A'
	l					l		graue A

		individual, and as a member or leader in diverse teams, and in multidisciplinary settings.			qualify the exam.	Industry Internship	UG/PLO/ID/ II	(>=75- 100%) Atleast 40% of the students shall
			Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			obtain a grade 'A' or above
10	Communication	The student will be able to communicate effectively on complex engineering activities with	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% of the students shall qualify the exam.	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		the engineering community and with society at large, such as, being able to comprehend and write effective	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry feedback	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
		reports and design documentation,	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall			

	make effective presentations, and give and receive clear instructions.			obtain grade 'A' (>=75- 100%)			
Project Management & Finance	The student will be able to demonstrate knowledge and understanding of Engineering and Management Principles as an individual, and as a member or leader in diverse teams considering economical and financial factors. Also, The student will be able to participate and succeed in competitive examinations.	Comprehensive Exam Major Project Rubrics	UG/PLO/D/CE UG/PLO/D/P2	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%) Atleast 40% of the students shall obtain a grade 'A' or above	Student Exit Survey Industry feedback	UG/PLO/ID/ ES UG/PLO/ID/II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40% of the students shall obtain a grade 'A' or above

12	Lifelong Learning	The student will understand the need for, and have the preparation and ability to	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		engage in independent and life-long learning in the broadest context of technological changes and contemporary issues.	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry feedback	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

### 5.7 Master's-Level Programme-

### M.Tech.(Structural Engineering)

### **5.7.1 Mission Statement**

### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Structural Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

### **5.7.2 Programme Educational Objectives (PEOs)**

Programme Educational Objectives

- 1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products through research and provide solutions as per industry and societal requirements.
- 2. The students shall have the ability to apply research knowledge and methods to solve engineering problems
- 3. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.
- 4. Students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur
- 5. The student will have the ability to support and practice independent and life-long learning for professional development.
- 6. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers

# 5.7.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

# 5.7.4 Programme Learning Outcomes

1. ′	The student will effectively apply knowledge of mathematics, applied sciences and engineering to solve complex problems using concept
(	of Structural Engineering
	The student will identify, analyze research literature and formulate Structural Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	The student will create solutions for complex Structural Engineering problems and design system components or processes that meet t specifications with appropriate consideration for the public health and safety, and the cultural, societal, and environmental consideration
4.	The student will carry out investigations of complex problems using research-based knowledge and research methods including design experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5.	The student will create, select, and apply appropriate techniques, resources, and modern engineering tools including prediction a modeling to different Structural Engineering activities as per the Industrial trends with an understanding of the limitations
6.	The student will apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and t consequent responsibilities relevant to the professional engineering practice.
7.	The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and demonstrate t knowledge of and need for the sustainable development.
8.	
9.	The student will demonstrate effectiveness as an individual and as a member or leader in teams and in multidisciplinary settings.
	). The student will use effective communication to cater to both technical and non-technical audiences.
1	1. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's ow work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
12	2. The student will recognise the need for and will engage in independent and life-long learning in the broadest context of technologic change.

# 5.7.5 Programme Operational Outcomes

Оре	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.

### **Operational Outcomes**

12 The faculty will support all the students for quality placements or join family business or start their own venture.

5.7.6 PEO's – PLO mapping-Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs)

The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{$  in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):

Goa Inte Stud	oad-Based Student Learning uls (PEQs) nded dent rning Outcomes Os)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
MA	STER'S LEVEL PROGRAM	[ <b>S</b>					
<i>M</i> .7	M.Tech Structural Engineering						
	Learning Outcome 1						

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
Learning Outcome 2	$\checkmark$	$\checkmark$				
Learning Outcome 3		$\checkmark$				
Learning Outcome 4		$\checkmark$				
Learning Outcome 5		$\checkmark$				
Learning Outcome 6			V			
Learning Outcome 7			V			
Learning Outcome 8						
Learning Outcome 9					$\checkmark$	
Learning Outcome 10					$\checkmark$	
Learning Outcome 11					$\checkmark$	

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
Learning Outcome 12						

# 5.7.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	Student will effectively apply knowledge of mathematics, applied sciences and engineering to solve complex	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		problems.	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, analyze research literature and formulate Computer Network &	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		Information Security problems reaching substantiated conclusions	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

		using first principles of mathematics, natural sciences, and engineering sciences.			marked satisfactory			
3	Design/Development of Solutions	The student will create solutions for complex Computer Network & Information Security problems and design system components	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		or processes that meet the specifications with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
4	Problem Analysis	The student will carry out investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75-100%)

		data, and synthesis of the information to provide valid conclusions.	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory			Atleast 40% of the students shall obtain a grade 'A' or above
5		The student will create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade A' (>=75-100%)
	differen enginee as per ti trends v understa	and modeling to different structural engineering activities as per the Industrial trends with an understanding of the limitations	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
6	The Engineer & Society	The student will apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		cultural issues and the consequent responsibilities relevant to the	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall

		professional			satisfactory or			obtain a grade
		engineering practice.			above			'A' or above
		engineering practice.			above			A of above
					100% of the			100% of the
					students shall			students shall
					pursue their			pursue their
					responsibility			responsibility
					towards			towards
					environment,			environment,
					society,			society,
					ethics, health,			ethics, health,
					safety, legal			safety, legal
					and cultural			and cultural
					issues			issues
		0.1.1	~			~		
7		Student will recognize the impact	Comprehensive	UG/PLO/D/CE	Atleast 40%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
		of the professional	Examination		of the			of the
		Computer Network			students shall			students shall
		& Information Security solutions in			obtain grade			give a
		societal and			'A' (>=75-			grade'A'
		environmental			100%)			(>=75-100%)
		contexts and	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80%	Industry Internship	UG/PLO/ID/ II	Atleast 40%
		demonstrate the knowledge of and	21550110010111001105	00,120,2,21	of the	mouse j mousep	00,120,12,12	of the
	Environment	need for the			students shall			students shall
	&Sustainbility	sustainable			be marked			obtain a grade
		development.			satisfactory or			'A' or above
					above			
								100% of the
					100% of the			students shall
					students shall			pursue their
					pursue their			responsibility
					responsibility			towards
					towards			environment,

					environment, society, ethics, health, safety, legal and cultural issues			society, ethics, health, safety, legal and cultural issues
8	Ethics	The student will apply ethical principles and demonstrate professional ethics, responsibilities and norms of the engineering practice.	Dissertation Rubrics Comprehensive Exam	UG/PLO/D/DN UG/PLO/D/CE Framework	Atleast 80% of the students shall be marked satisfactory or above 100% of the students shall have plagiarism 15% or below Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%) 100% of the students shall have plagiarism 15% or below
			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader in teams and in multidisciplinary settings.	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
						Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade
			Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)			'A' or above
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory			
10	Communication	The student will use effective communication to cater to both technical and	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)

		non-technical audiences.	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
			Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)			
11	Project Management & Finance	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)

12	Lifelong Learning	The student will	Comprehensive Exam	UG/PLO/D/CE	Atleast 40%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
		recognise the			of the			of the
		need for and will			students shall			students shall
		engage in			obtain grade			give a
		independent and			'A' (>=75-			grade'A'
		life-long			100%)			(>=75-100%)
		learning in the						
		broadest context	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80%	Industry Internship	UG/PLO/ID/II	Atleast 40%
		of technological			of the			of the
		change.			students			students shall
					shall be			obtain a grade
					marked			'A' or above
					satisfactory			
					satisfactory			

#### 5. 8 Master's-Level Programme-

### M.Tech.(Environmental Engineering)

#### **5.8.1 Mission Statement**

### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Environmental Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

### 5.8.2 Programme Educational Objectives (PEOs)

Programme	Educational Objectives
1.	The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products
	through research and provide solutions as per industry and societal requirements.
2.	The students shall have the ability to apply research knowledge and methods to solve engineering problems
3.	The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.
4.	Students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/leader in diverse teams and as an entrepreneur
5.	The student will have the ability to support and practice independent and life-long learning for professional development.
6.	Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers

# 5.8.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.
# 5.8.4 Programme Learning Outcomes

Intended Learning Outcomes
1. The student will effectively apply knowledge of mathematics, applied sciences and engineering to solve complex problems using concepts of Environmental Engineering
2. The student will identify, analyze research literature and formulate Environmental Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. The student will create solutions for complex Environmental Engineering problems and design system components or processes that meet the specifications with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. The student will carry out investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. The student will create, select, and apply appropriate techniques, resources, and modern engineering tools including prediction and modeling to different civil engineering activities as per the Industrial trends with an understanding of the limitations.
6. The student will apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for the sustainable development.
<ol> <li>8. The student will apply ethical principles and demonstrate professional ethics, responsibilities and norms of the engineering practice.</li> <li>9. The student will demonstrate effectiveness as an individual and as a member or leader in teams and in multidisciplinary settings.</li> </ol>
10. The student will use effective communication to cater to both technical and non-technical audiences.
11. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
12. The student will recognise the need for and will engage in independent and life-long learning in the broadest context of technological change.

## 5.8.5 **Programme Operational Outcomes**

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.

# Operational Outcomes 12 The faculty will support all the students for quality placements or join family business or start their own venture.

#### 5.8.6 PEO's – PLO mapping

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs)

The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{$  in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):



Broad-Based Program Learning Goals (PEQs) Intended Program Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
Learning Outcome 1	V				
Learning Outcome 2	V				
Learning Outcome 3	V				
Learning Outcome 4	V				
Learning Outcome 5	<mark>~</mark>				
Learning Outcome 6		V			
Learning Outcome 7		V			
Learning Outcome 8			N		
Learning Outcome 9				<mark>√</mark>	
Learning Outcome 10				<mark>√</mark>	

Broad-Based Program Learning Goals (PEQs) Intended Program Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
Learning Outcome 11				N	
Learning Outcome 12					N

## 5.8.7 Student Learning Assessment for <u>M.Tech.(Environmental Engineering</u>)

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	PLO1	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	PLO2	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)

			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
3	Decier (Decelerment	PLO3	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
	Design/Development of Solutions		Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
4	Problem Analysis	PLO4	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
						Industry Internship	UG/PLO/ID/ II	

			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory			Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	PLO5	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade A' (>=75-100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
6	The Engineer & Society	PLO6	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall

					satisfactory or above			obtain a grade 'A' or above
					100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues
7		PLO7	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
	Environment & Sustainbility		Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory or above 100% of the students shall pursue their responsibility towards	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment,

					environment, society, ethics, health, safety, legal and cultural issues			society, ethics, health, safety, legal and cultural issues
8	Ethics	PLO8	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory or above 100% of the students shall have plagiarism 15% or below	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%) 100% of the students shall have plagiarism 15% or below
			Comprehensive Exam Behavioural Science Rubrics	UG/PLO/D/CE Framework UG/PLO9/D/BS	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%) Atleast 85% students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

9	Individual and Team	PLO9	Foreign Business	UG/PLO9/D/F	Atleast 85%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
	Work		Language Rubrics	BL	students shall	5		of the
			0 0		qualify the			students shall
					exam			give a
								grade'A'
								(>=75-100%)
						Industry Internship	UG/PLO/ID/ II	Atleast 40%
								of the
								students shall
			Comprehensive Exam	UG/PLO/D/CE	Atleast 40%			obtain a grade
					of the			'A' or above
					students shall			
					obtain grade			
					'A' (>=75-			
					100%)			
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80%			
			Dissertation Rubites	00/120/0/01	of the			
					students			
					shall be			
					marked			
					satisfactory			
10		PLO10	Business	UG/PLO10/D/	Atleast 85%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
			Communication	BC	students shall	······································		of the
			Rubrics	_	qualify the			students shall
	Commission				exam			give a
	Communication							grade'A'
								(>=75-100%)

			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marked satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
			Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)			
11	Project Management & Finance	PLO11	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
12	Life long learning	PLO12	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

		marked		
		satisfactory		

5.9 Bachelor's-Level Programme -

B.Tech.(Mechanical & Automation Engineering/ Mechanical Engineering/ Automobile Engineering),

B.Tech (Mechanical & Automation Engineering– Evening/ Mechanical Engineering- Evening)

**5.9.1 Mission Statement** 

#### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Mechanical Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

5.9.2 Programme Educational Objectives (PEOs)

Programme Educational Objectives

1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products/ solutions as per industry and societal requirements.

2. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.

3. The students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur.

4. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers.

5. The student will have the ability to support and practice independent and life-long learning for professional development

#### **5.9.3 Programme Operational Objectives**

S.No	Operational Goals							
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students							
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research							
3	he Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.							
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.							
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.							
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.							
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs							
8	The Programme will create opportunities for international exposure for its students and faculty.							

# 5.9.4 Programme Learning Outcomes

Intended L	earning Outcomes
1	The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of mechanical &
1.	automation engineering.
2.	The student will identify, formulate research literature and analyze mechanical & automation engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	The student will create solutions for mechanical & automation engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations.
4.	The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions
5.	The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for Engineering practice as per the Industrial trends with an understanding of the limitations.
6.	
7.	The student will recognize the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development.
8.	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.
9.	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.
10	. The student will use effective communication to cater to both technical and non-technical audiences.
11	. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
12	. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change.

## 5.9.5 **Programme Operational Outcomes**

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

#### 5.9.6 PEO's – PLO mapping

Broad-Based Student Learning PEO PEO PEO PEO Goals (PEOs) PEO 5 2 3 4 1 Programme Learning Outcome (PLOs) BACHELOR'S LEVEL PROGRAMS B.TECH Learning Outcome 1  $\sqrt{}$ Learning Outcome 2  $\sqrt{}$ Learning Outcome 3  $\sqrt{}$ Learning Outcome 4  $\sqrt{}$ Learning Outcome 5  $\sqrt{}$ Learning Outcome 6  $\sqrt{}$ Learning Outcome 7  $\sqrt{}$ Learning Outcome 8  $\sqrt{}$ Learning Outcome 9  $\sqrt{}$ Learning Outcome 10  $\sqrt{}$ 

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs). The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summarizes of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{in a given cell of the table indicates the intended learning goals in that row is associated with the learning goal in that column.):$ 

Broad-Based Student Learning Goals (PEOs) Programme Learning Outcome (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
Learning Outcome 11					
Learning Outcome 12					

## 5.9.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will apply knowledge of mathematics, sciences and engineering to solve problems	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		using concepts of mechanical & automation engineering	nts Major Project Rubrics Al		Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, formulate research literature and analyze mechanical &	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		automation engineering problems reaching substantiated	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

		conclusions using first principles of mathematics, natural sciences, and engineering sciences						grade 'A' or above
3	Design/Development of Solutions	The student will create solutions for mechanical & automation engineering problems and design system	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		components or processes that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

4	Problem Analysis	The student will carry out	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the
		investigations of	Enumerion		shall obtain	Survey		students shall
		problems using			grade 'A'			give a
		research-based			(>=75-100%)			grade'A'
		knowledge and			``````````````````````````````````````			(>=75-
		research						100%)
		methods						
		including design				Industry Internship	UG/PLO/ID/ II	Atleast 40%
		of experiments,						of the
		analysis and	Major Project Rubrics	UG/PLO/D/P2	Atleast 40%			students shall
		interpretation of			of the students			obtain a
		data and			shall obtain a			grade 'A' or
		synthesis of			grade 'A' or			above
		information to			above			
		provide valid						
		conclusions						
5	Modern Tool Usage	The student will	Comprehensive	UG/PLO/D/CE	Atleast 20%	Student Exit	UG/PLO/ID/	Atleast 85%
		create, select	Examination		of the students	Survey	ES	of the
		and apply			shall obtain			students shall
		appropriate			grade 'A'			give a
		techniques,			(>=75-100%)			grade'A'
		resources and						(>=75-
		modern						100%)
		engineering and				<b>x</b> 1 . <b>x</b>		
		IT tools,	Major Project Rubrics	UG/PLO/D/P2	Atleast 40%	Industry Internship	UG/PLO/ID/ II	Atleast 40%
		necessary for			of the students			of the
		engineering			shall obtain a			students shall
		practice as per			grade 'A' or			obtain a
		the Industrial			above			grade 'A' or above
		trends with an						above
		understanding						

		of the limitations						
6	The Engineer & Society	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
	cultural issues and consequent responsibilities relevant to the professional engineering	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above	
		practice			students shall pursue their responsibility towards environment, society, ethics,			100% of the students shall pursue their responsibility towards environment,
					health, safety, legal and cultural issues			society, ethics, health, safety, legal

								and cultural issues
7	Environment & Sustainability		Comprehensive Examination Major Project Rubrics	UG/PLO/D/CE UG/PLO/D/P2	Atleast 20% of the students shall obtain grade 'A' (>=75-100%) Atleast 40% of the students	Student Exit Survey	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40% of the
		demonstrate the knowledge if and need for the sustainable development			of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues

8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall have plagiarism 15% or below	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%) 100% of the students shall have
			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)			plagiarism 15% or below
			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)

		undertake a common goal in multidisciplinary settings	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
			Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above			
10	Communication	The student will use effective communication to cater to both technical and non-technical audiences	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

			Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)			
11	ProjectThe student willManagement &demonstrateFinanceknowledge andunderstanding ofthe engineeringand managementprinciples andapply these to	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade <sup>•</sup> A' (>=75- 100%)	
		appry filese to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade A' (>=75- 100%)
			Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students	Industry Internship	UG/PLO/ID/II	Atleast 40% of the

of technological		shall obtain a		students shall
change		grade 'A' or		obtain a
		above		grade 'A' or
				above

#### 5. 10 Master's-Level Programme -

#### M.Tech.(Automobile Engineering)

B.Tech + M.Tech (AME)- Integrated

#### **5.10.1 Mission Statement**

#### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Automobile Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

5.10.2 Programme Educational Objectives (PEOs)

1.	The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovativ products through research and provide solutions as per industry and societal requirements.
2.	The students shall have the ability to apply research knowledge and methods to solve engineering problems
	The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural an environmental contexts.
4.	Students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team membe leader in diverse teams and as an entrepreneur
5.	The student will have the ability to support and practice independent and life-long learning for professional development.
6.	

## 5.10.3 Programme Operational Objectives

S.No	Operational Goals							
1	The Programme of M.Tech Automobile Engineering will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students							
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research							
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.							
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.							
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.							
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.							
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs							
8	The Programme will create opportunities for international exposure for its students and faculty.							

## 5.10.4 Programme Learning Outcomes

1.	The student will apply knowledge of mathematics, sciences and engineering to solve complex problems using concepts of
	computer science & engineering.
2.	The student will identify, formulate research literature and analyze complex automobile engineering problems reaching
	substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
3.	The student will create solutions for computer science & engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations
4.	The student will carry out investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions
5.	The student will create, select and apply appropriate techniques, resources and modern engineering tools including prediction and modelling to different automobile engineering activities as per the Industrial trends with an understanding of the limitations.
6.	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.
7.	The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and and demonstrate the knowledge if and need for the sustainable development.
8.	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.
9.	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.
10.	The student will use effective communication to cater to both technical and non-technical audiences.
11.	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
12.	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change

## 5.10.5 Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

#### 5.10.6 PEO's – PLO mapping

Broad-Based Student Learning Goals (PEOs) Programme Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
MASTER'S LEVEL PROGRAM	IS					
Name of the programme						
Learning Outcome 1		$\checkmark$				
Learning Outcome 2		$\checkmark$				
Learning Outcome 3		$\checkmark$				
Learning Outcome 4						
Learning Outcome 5						
Learning Outcome 6			$\checkmark$			
Learning Outcome 7			$\checkmark$			
Learning Outcome 8				V		

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs). The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summarizes of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):$ 

Broad-Based Student Learning Goals (PEOs) Programme Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
Learning Outcome 9					$\checkmark$	
Learning Outcome 10						
Learning Outcome 11						
Learning Outcome 12						

## 5.10.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will apply knowledge of mathematics, sciences and engineering to solve problems	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		solve problems using concepts of automobile engineering	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, formulate research literature and analyze automobile	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		engineering problems reaching substantiated conclusions	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a
		using first principles of mathematics, natural sciences, and engineering sciences						grade 'A' or above
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3	Design/Development of Solutions	The student will create solutions automobile engineering problems and design system components or	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
	components or processes that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above	

4	Problem Analysis	The student will carry out investigations of problems using	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A'	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a
		research-based knowledge and research methods			(>=75-100%)			grade'A' (>=75- 100%)
		including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	The student will create, select and apply appropriate techniques, resources and modern engineering and	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		tools, necessary for engineering practice as per the Industrial trends with an understanding	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

		of the limitations						
6	The Engineer & Society	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		cultural issues and consequent responsibilities relevant to the professional engineering practice	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory 100% of the students shall	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
		priorite			pursue their responsibility towards environment, society, ethics, health, safety, legal and			100% of the students shall pursue their responsibility towards environment, society,
					cultural issues			ethics, health, safety, legal

								and cultural issues
7	Environment & Sustainability	The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and	Comprehensive Examination Dissertation Rubrics	UG/PLO/D/CE UG/PLO/D/DN	Atleast 40% of the students shall obtain grade 'A' (>=75-100%) Atleast 80% of the students	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40% of the
		demonstrate the knowledge if and need for the sustainable development			shall be marks shall be marks satisfactory 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues

8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory 100% of the students shall	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		and norms of the engineering practice			have plagiarism 15% or below			100% of the students shall have
			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)			plagiarism 15% or below
			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)

		undertake a common goal in multidisciplinary settings	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory			
10	Communication	The student will use effective communication to cater to both technical and non-technical audiences	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or
			Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)			above

11	Project Management & Finance	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		of technological change	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

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5.11 Masters

#### M.Tech.(Industrial & Production Engineering)

#### **5.11.1 Mission Statement**

# Programme Mission "To provide education in the futuristic and emerging frontier areas of Industrial & Production Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

5.11.2 Programme Educational Objectives (PEOs)

Programme Educational Objectives

- 1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products through research and provide solutions as per industry and societal requirements.
- 2. The students shall have the ability to apply research knowledge and methods to solve engineering problems
- 3. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.
- 4. Students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur
- 5. The student will have the ability to support and practice independent and life-long learning for professional development.
- 6. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers

#### 5.11.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme of M.Tech Industrial & Production Engineering will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.

6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

## 5.11.4 Programme Learning Outcomes

1	. The student will apply knowledge of mathematics, sciences and engineering to solve complex problems using concepts o
	industrial & production engineering.
2	. The student will identify, formulate research literature and analyze complex industrial & production engineering problen reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
3	. The student will create solutions for computer science & engineering problems and design system components or proces
	that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations
4	. The student will carry out investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusted on the student of the student statement
5	. The student will create, select and apply appropriate techniques, resources and modern engineering tools including predict and modelling to different engineering activities as per the Industrial trends with an understanding of the limitations.
6	. The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural is and consequent responsibilities relevant to the professional engineering practice.
7	. The student will recognize the impact of the professional engineering solutions in societal and environmental contexts an and demonstrate the knowledge if and need for the sustainable development.
8	. The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineerin practice.
9	. The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.
1	0. The student will use effective communication to cater to both technical and non-technical audiences.
1	1. The student will demonstrate knowledge and understanding of the engineering and management principles and apply the one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
1	2. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change

## 5.11.5 Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

#### 5.11.6 PEO's – PLO mapping

Broad-Based Student Learning Goals (PEOs) Programme Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
MASTER'S LEVEL PROGRAM	IS					
Name of the programme						
Learning Outcome 1		$\checkmark$				
Learning Outcome 2		$\checkmark$				
Learning Outcome 3		$\checkmark$				
Learning Outcome 4		$\checkmark$				
Learning Outcome 5		$\checkmark$				
Learning Outcome 6			$\checkmark$			
Learning Outcome 7			V			
Learning Outcome 8				$\checkmark$		

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs). The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summarizes of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{ in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):$ 

Broad-Based Student Learning Goals (PEOs) Programme Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
Learning Outcome 9						
Learning Outcome 10					$\checkmark$	
Learning Outcome 11						
Learning Outcome 12						

# 5.11.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will apply knowledge of mathematics, sciences and engineering to solve problems	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		using concepts of industrial & production engineering	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, formulate research literature and analyze industrial &	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		production engineering problems reaching substantiated	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

		conclusions using first principles of mathematics, natural sciences, and engineering sciences						grade 'A' or above
3	Design/Development of Solutions	The student will create solutions automobile engineering problems and design system components or processes that	Comprehensive Examination Dissertation Rubrics	UG/PLO/D/CE UG/PLO/D/DN	Atleast 40% of the students shall obtain grade 'A' (>=75-100%) Atleast 80%	Student Exit Survey Summer Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75-100%) Atleast 40%
		meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations			of the students shall be marks satisfactory			of the students shall obtain a grade 'A' or above

4	Problem Analysis	The student will carry out investigations of problems using research-based knowledge and research methods	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	The student will create, select and apply appropriate techniques, resources and modern engineering and	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		tools, necessary for engineering practice as per the Industrial trends with an understanding	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

		of the limitations						
6	The Engineer & Society	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		cultural issues and consequent responsibilities relevant to the professional engineering practice	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health
								health, safety, legal

								and cultural issues
7	Environment & Sustainability	The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and	Comprehensive Examination Dissertation Rubrics	UG/PLO/D/CE UG/PLO/D/DN	Atleast 40% of the students shall obtain grade 'A' (>=75-100%) Atleast 80% of the students	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40% of the
		demonstrate the knowledge if and need for the sustainable development			shall be marks shall be marks satisfactory 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues

8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory 100% of the students shall have	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		engineering practice			plagiarism 15% or below			100% of the students shall have
			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)			plagiarism 15% or below
			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)

		undertake a common goal in multidisciplinary settings	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory			
10	Communication	The student will use effective communication to cater to both technical and non-technical audiences	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or
			Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)			above

11	Project Management & Finance	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		of technological change	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

5.12 Masters

#### **M.Tech.**(Mechatronics Engineering)

#### **5.12.1 Mission Statement**

#### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Mechatronics Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

5.12.2 Programme Educational Objectives (PEOs)

Programme Educational Objectives

- 1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products through research and provide solutions as per industry and societal requirements.
- 2. The students shall have the ability to apply research knowledge and methods to solve engineering problems
- 3. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.
- 4. Students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur
- 5. The student will have the ability to support and practice independent and life-long learning for professional development.
- 6. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers

#### 5.12.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme of M.Tech Mechatronics Engineering will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.

6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

## 5.12.4 Programme Learning Outcomes

tended Lea	rning Outcomes
	1. The student will apply knowledge of mathematics, sciences and engineering to solve complex problems using concepts of Mechatronics Engineering
	<ol> <li>The student will identify, formulate research literature and analyze complex Mechatronics Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences</li> </ol>
	<ol> <li>The student will create solutions for Mechatronics Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations</li> </ol>
	4. The student will carry out investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions
	5. The student will create, select and apply appropriate techniques, resources and modern engineering tools including prediction and modelling to different engineering activities as per the Industrial trends with an understanding of the limitations.
	6. The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.
	7. The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and and demonstrate the knowledge if and need for the sustainable development.
	8. The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.
	<ol> <li>The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.</li> </ol>
	10. The student will use effective communication to cater to both technical and non-technical audiences.
	11. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
	12. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change

## 5.12.5 Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

#### 5.12.6 PEO's – PLO mapping

Broad-Based Student Learning Goals (PEOs) Programme Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
MASTER'S LEVEL PROGRAM	IS					
Name of the programme						
Learning Outcome 1		$\checkmark$				
Learning Outcome 2						
Learning Outcome 3		$\checkmark$				
Learning Outcome 4		$\checkmark$				
Learning Outcome 5		$\checkmark$				
Learning Outcome 6			$\checkmark$			
Learning Outcome 7			$\checkmark$			
Learning Outcome 8				$\checkmark$		

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs). The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summarizes of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{}$  in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):

Broad-Based Student Learning Goals (PEOs) Programme Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
Learning Outcome 9						
Learning Outcome 10						
Learning Outcome 11						
Learning Outcome 12						

# 5.12.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will apply knowledge of mathematics, sciences and engineering to solve problems	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		using concepts of Mechatronics Engineering	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, formulate research literature and analyze Mechatronics	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		Engineering problems reaching substantiated conclusions	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

		using first principles of mathematics, natural sciences, and engineering sciences						grade 'A' or above
3	Design/Development of Solutions	The student will create solutions Mechatronics Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations	Comprehensive Examination Dissertation Rubrics	UG/PLO/D/CE UG/PLO/D/DN	Atleast 40% of the students shall obtain grade 'A' (>=75-100%) Atleast 80% of the students shall be marks satisfactory	Student Exit Survey Summer Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75-100%) Atleast 40% of the students shall obtain a grade 'A' or above

4	Problem Analysis	The student will carry out investigations of problems using research-based	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A'
		knowledge and research methods			(>=/3-10070)	Industry Internship	UG/PLO/ID/ II	(>=75- 100%)
		including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory			of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	The student will create, select and apply appropriate techniques, resources and modern engineering and	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		tools, necessary for computing practice as per the Industrial trends with an understanding	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

		of the limitations						
6	The Engineer & Society	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		cultural issues and consequent responsibilities relevant to the professional engineering practice	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics,
								health, safety, legal

								and cultural issues
7	Environment & Sustainability	The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and	Comprehensive Examination Dissertation Rubrics	UG/PLO/D/CE UG/PLO/D/DN	Atleast 40% of the students shall obtain grade 'A' (>=75-100%) Atleast 80% of the students	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40% of the
		demonstrate the knowledge if and need for the sustainable development			shall be marks shall be marks satisfactory 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues

8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory 100% of the students shall	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		and norms of the engineering practice			have plagiarism 15% or below			100% of the students shall have
			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)			plagiarism 15% or below
			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)

		undertake a common goal in multidisciplinary settings	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory			
10	Communication	The student will use effective communication to cater to both technical and non-technical audiences	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or
			Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)			above
11	Project Management & Finance	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
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		one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		of technological change	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

## 5.13 M.Tech.(Thermal & Fluid Sciences)

### **5.13.1 Mission Statement**

Programme Mission
"To provide education in the futuristic and emerging frontier areas of Thermal & Fluid Sciences as per latest technologies of Industry 4.0 through
knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering
professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and
wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

# 5.13.2 Programme Educational Objectives (PEOs)

Programme Educational Objectives

- 1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products through research and provide solutions as per industry and societal requirements.
- 2. The students shall have the ability to apply research knowledge and methods to solve engineering problems
- 3. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.
- 4. Students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur
- 5. The student will have the ability to support and practice independent and life-long learning for professional development.
- 6. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers

5.13.3 Programme	Operational	Objectives
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S.No	Operational Goals				
1	The Programme of M.Tech Thermal & Fluid Sciences will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students				
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research				
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.				
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.				
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.				
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.				
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs				
8	The Programme will create opportunities for international exposure for its students and faculty.				

# 5.13.4 Programme Learning Outcomes

ntended Learn	aing Outcomes
	1. The student will apply knowledge of mathematics, sciences and engineering to solve complex problems using concepts of Thermal & Fluid Sciences.
	2. The student will identify, formulate research literature and analyze complex automobile engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
	<ol> <li>The student will create solutions for engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations</li> </ol>
	4. The student will carry out investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions
	5. The student will create, select and apply appropriate techniques, resources and modern engineering tools including prediction and modelling to different engineering activities as per the Industrial trends with an understanding of the limitations.
	6. The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.
	7. The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development.
	8. The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.
	9. The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.
	10. The student will use effective communication to cater to both technical and non-technical audiences.
	11. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
	12. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change

# 5.13.5 Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

# 5.13.6 PEO's – PLO mapping

Broad-Based Student Learning Goals (PEOs) Programme Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
MASTER'S LEVEL PROGRAM	IS					
Name of the programme						
Learning Outcome 1		$\checkmark$				
Learning Outcome 2		$\checkmark$				
Learning Outcome 3		$\checkmark$				
Learning Outcome 4						
Learning Outcome 5						
Learning Outcome 6						
Learning Outcome 7						
Learning Outcome 8						

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs). The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summarizes of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{}$  in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):

Broad-Based Student Learning Goals (PEOs) Programme Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
Learning Outcome 9					$\checkmark$	
Learning Outcome 10						
Learning Outcome 11						
Learning Outcome 12						

# 5.13.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will apply knowledge of mathematics, sciences and engineering to solve problems	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		solve problems using concepts of thermal and fluid sciences	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, formulate research literature and analyze engineering	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		problems reaching substantiated conclusions using first	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

		principles of mathematics, natural sciences, and engineering sciences						grade 'A' or above
3	Design/Development of Solutions	The student will create solutions engineering problems and design system components or processes that	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

4	Problem Analysis	The student will carry out investigations of problems using research-based knowledge and	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-
		research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/ II	100%) Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	conclusions The student will create, select and apply appropriate techniques, resources and modern engineering and tools, necessary for engineering practice as per the Industrial trends with an understanding	Comprehensive Examination Dissertation Rubrics	UG/PLO/D/CE UG/PLO/D/DN	Atleast 40% of the students shall obtain grade 'A' (>=75-100%) Atleast 80% of the students shall be marks satisfactory	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40% of the students shall obtain a grade 'A' or above

		of the limitations						
6	The Engineer & Society	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and	Comprehensive Examination	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		cultural issues and consequent responsibilities relevant to the professional engineering practice	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics,
								health, safety, legal

								and cultural issues
7	Environment & Sustainability	The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and	Comprehensive Examination Dissertation Rubrics	UG/PLO/D/CE UG/PLO/D/DN	Atleast 40% of the students shall obtain grade 'A' (>=75-100%) Atleast 80% of the students	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40% of the
		demonstrate the knowledge if and need for the sustainable development			shall be marks shall be marks satisfactory 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues

8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory 100% of the students shall	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		and norms of the engineering practice			have plagiarism 15% or below			100% of the students shall have
			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)			plagiarism 15% or below
			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)

		undertake a common goal in multidisciplinary settings	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory			
10	Communication	The student will use effective communication to cater to both technical and non-technical audiences	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or
			Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)			above

11	Project Management & Finance	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context	Comprehensive Exam	UG/PLO/D/CE	Atleast 40% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		of technological change	Dissertation Rubrics	UG/PLO/D/DN	Atleast 80% of the students shall be marks satisfactory	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

### 5.14 Master's-Level Programme -

# M. Tech (Electronics & Communication Engineering)

### **5.14.1 Mission Statement**

# **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Electronics & Communication as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

# **5. 14.2 Programme Educational Objectives (PEOs)**

e Educational Objectives
1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products/ solutions as per industry and societal requirements.
2. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.
3. The students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur.
4. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers.
5. The student will have the ability to support and practice independent and life-long learning for professional development.

# 5. 14.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

# **5. 14.4 Programme Learning Outcomes**

Intended Learning Outcomes

1. The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Electronics and Communication Engineering.

2. The student will identify, formulate research literature and analyze Electronics and Communication Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. The student will create solutions for computer science & engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations.

4. The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

5. The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for computing practices as per the Industrial trends with an understanding of the limitations.

6. The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.

7. The student will recognize the impact of the professional engineering solutions in political, economic, global, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development.

8. The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.

9. The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.

10. The student will use effective communication to cater to both technical and non-technical audiences.

11. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.

12. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change and contemporary issues.

# 5. 14.5Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

# 5. 14.6 Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs)

The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{\text{ in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):$ 

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
MASTER'S LEVEL PROGRAM	IS					
Name of the programme						
Learning Outcome 1	$\checkmark$	$\checkmark$				
Learning Outcome 2		$\checkmark$				
Learning Outcome 3		$\checkmark$				
Learning Outcome 4		$\checkmark$				

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
Learning Outcome 5	$\checkmark$	$\checkmark$				
Learning Outcome 6			$\checkmark$			
Learning Outcome 7						
Learning Outcome 8						
Learning Outcome 9						
Learning Outcome 10						
Learning Outcome 11						
Learning Outcome 12					N	

# 5. 14.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	PLO1	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	PLO2	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

								grade 'A' or above
3	Design/Development of Solutions	PLO3	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
4	Problem Analysis	PLO4	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

					grade 'A' or above			grade 'A' or above
5	Modern Tool Usage	PLO5	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
6	The Engineer & Society	PLO6	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

					grade 'A' or above			grade 'A' or above
					100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues
7	Environment & Sustainability	PLO7	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall
					pursue their			pursue their

					responsibility towards environment, society, ethics, health, safety, legal and cultural issues			responsibility towards environment, society, ethics, health, safety, legal and cultural issues
8	Ethics	PLO8	Dissertation Rubrics Comprehensive Examination	UG/PLO/D/DN UG/PLO/D/CE	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall have plagiarism 15% or below Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%) 100% of the students shall have plagiarism 15% or below

			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% of the students shall qualify the exam.	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	PLO9	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% of the students shall qualify the exam.	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade <sup>•</sup> A <sup>•</sup> (>=75- 100%)
						Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall
			Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			obtain a grade 'A' or above
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above			

10	Communication	PLO10	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% of the students shall qualify the exam.	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
			Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			
11	Project Management & Finance	PLO11	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A'

								(>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	PLO12	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

## 5.15 Master's-Level Programme -

## M. Tech (Wireless Communication)

# 5.15.1 Mission Statement

### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Wireless Communication as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

# 5.15.2 Programme Educational Objectives (PEOs)

# Educational Goals The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products through research and provide solutions as per industry and societal requirements. The students shall have the ability to apply research knowledge and methods to solve engineering problems The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts. Students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur The student will have the ability to support and practice independent and life-long learning for professional development. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective

performance in the professional/entrepreneurial careers

# 5.15.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

# 5.15.4 Programme Learning Outcomes

Intended Learning Outcomes	
1. The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Electronic ending and the student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Electronic ending and the student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Electronic ending and the student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Electronic ending and the student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Electronic ending and the student will be apply the student ending and	ronics and
Communication Engineering.	
2. The student will identify, formulate research literature and analyze Electronics and Communication Engineering problem substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	s reaching
3. The student will create solutions for computer science & engineering problems and design system components or proc	cesses that
meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, soc	cietal, and
environmental considerations.	
4. The student will carry out investigations of problems using research-based knowledge and research methods including experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.	design of
5. The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, nec computing practices as per the Industrial trends with an understanding of the limitations.	essary for
6. The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural consequent responsibilities relevant to the professional engineering practice.	issues and
7. The student will recognize the impact of the professional engineering solutions in political, economic, global, so environmental contexts and demonstrate the knowledge if and need for the sustainable development.	cietal and
8. The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering	g practice.
9. The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a goal in multidisciplinary settings.	
10. The student will use effective communication to cater to both technical and non-technical audiences.	
11. The student will demonstrate knowledge and understanding of the engineering and management principles and apply the	se to one's
own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.	se to one s
12. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technologi	ical change
and contemporary issues.	ical change

# 5.15.5Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

# 5.15.6 Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs)

The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{}$  in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
MASTER'S LEVEL PROGRAM	IS					
Name of the programme						
Learning Outcome 1	$\checkmark$	$\checkmark$				
Learning Outcome 2		$\checkmark$				
Learning Outcome 3		$\checkmark$				
Learning Outcome 4		$\checkmark$				
Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
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Learning Outcome 5	$\checkmark$	$\checkmark$				
Learning Outcome 6			V			
Learning Outcome 7			$\checkmark$			
Learning Outcome 8				V		
Learning Outcome 9						
Learning Outcome 10						
Learning Outcome 11						
Learning Outcome 12					N	

# 5.15.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	PLO1	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	PLO2	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

								grade 'A' or above
3	Design/Development of Solutions	PLO3	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
4	Problem Analysis	PLO4	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

					grade 'A' or above			grade 'A' or above
5	Modern Tool Usage	PLO5	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
6	The Engineer & Society	PLO6	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

					grade 'A' or above 100% of the			grade 'A' or above 100% of the
					students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues
7	Environment & Sustainability	PO7	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the
					students shall pursue their			students shall pursue their

					responsibility towards environment, society, ethics, health, safety, legal and cultural issues			responsibility towards environment, society, ethics, health, safety, legal and cultural issues
8	Ethics	PLO8	Dissertation Rubrics Comprehensive Examination	UG/PLO/D/DN UG/PLO/D/CE	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall have plagiarism 15% or below Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%) 100% of the students shall have plagiarism 15% or below

			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% of the students shall qualify the exam.	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	PLO9	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% of the students shall qualify the exam.	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
						Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall
			Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			obtain a grade 'A' or above
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above			

10	Communication	PLO10	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% of the students shall qualify the exam.	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
			Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			
11	Project Management & Finance	PLO11	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A'

								(>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	g Learning PLO12	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

M. Tech (VLSI)

#### **5.16.1 Mission Statement**

#### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Very Large Scale Integration as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

## 5.16.2 Programme Educational Objectives (PEOs)

#### **Educational Goals**

- 1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products through research and provide solutions as per industry and societal requirements.
- 2. The students shall have the ability to apply research knowledge and methods to solve engineering problems
- 3. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.
- 4. Students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur
- 5. The student will have the ability to support and practice independent and life-long learning for professional development.
- 6. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers

# 5.16.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

#### **5.16.4 Programme Learning Outcomes**

Intended Learning Outcomes

1. The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Electronics and Communication Engineering.

2. The student will identify, formulate research literature and analyze Electronics and Communication Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. The student will create solutions for computer science & engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations.

4. The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

5. The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for computing practices as per the Industrial trends with an understanding of the limitations.

6. The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.

7. The student will recognize the impact of the professional engineering solutions in political, economic, global, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development.

8. The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.

9. The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.

10. The student will use effective communication to cater to both technical and non-technical audiences.

11. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.

12. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change and contemporary issues.

# 5.16.5Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

## 5.16.6 Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs)

The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{\text{ in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):$ 

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
MASTER'S LEVEL PROGRAM	IS					
Name of the programme						
Learning Outcome 1		$\checkmark$				
Learning Outcome 2	$\checkmark$	$\checkmark$				
Learning Outcome 3		$\checkmark$				
Learning Outcome 4		$\checkmark$				
Learning Outcome 5	$\checkmark$	$\checkmark$				

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
Learning Outcome 6			$\checkmark$			
Learning Outcome 7						
Learning Outcome 8				$\checkmark$		
Learning Outcome 9						
Learning Outcome 10						
Learning Outcome 11						
Learning Outcome 12					N	

# 5.16.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	PLO1	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	PLO2	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

								grade 'A' or above
3	Design/Development of Solutions	PLO3	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
4	Problem Analysis	PLO4	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

					grade 'A' or above			grade 'A' or above
5	Modern Tool Usage	PLO5	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
6	The Engineer & Society	PLO6	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

				grade 'A' or above			grade 'A' or above
				100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues
Environment & Sustainability	PLO7	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall
			Sustainability	Sustainability	Environment &       PLO7       Comprehensive Examination       UG/PLO/D/CE       Atleast 20% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues         Sustainability       PLO7       Comprehensive Examination       UG/PLO/D/CE       Atleast 20% of the students shall obtain grade 'A' (>=75-100%)         Dissertation Rubrics       UG/PLO/D/DN       Atleast 40% of the students shall obtain grade 'A' or above         100% of the       100% of the       100% of the	Environment & SustainabilityPLO7Comprehensive Examination UG/PLO/D/CEUG/PLO/D/CE Atleast 20% of the students shall environment, society, ethics, health, safety, legal and cultural issuesStudent Exit SurveyEnvironment & SustainabilityPLO7Comprehensive Examination Dissertation RubricsUG/PLO/D/CE VG/PLO/D/CEAtleast 20% of the students shall obtain grade 'A' (>=75- 100%)Student Exit SurveyDissertation RubricsUG/PLO/D/DN adoveAtleast 40% of the students shall obtain a grade 'A' or aboveIndustry Internship of the students shall obtain a grade 'A' or above	Environment &       PLO7       Comprehensive Examination       UG/PLO/D/CE       Atleast 20% of the student shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues       UG/PLO/ID/ES         Sustainability       PLO7       Comprehensive Examination       UG/PLO/D/CE       Atleast 20% of the student shall obtain grade 'A' (>=75-100%)       UG/PLO/ID/ID       Student Exit Survey       UG/PLO/ID/II         Dissertation Rubrics       UG/PLO/D/DN       Atleast 40% of the students shall obtain grade 'A' (>=75-100%)       Industry Internship       UG/PLO/ID/II         Dissertation Rubrics       UG/PLO/D/DN       Atleast 40% of the students shall obtain a grade 'A' (>=75-100%)       Industry Internship       UG/PLO/ID/II         0100% of the       100% of the       100% of the       100% of the       100% of the

					responsibility towards environment, society, ethics, health, safety, legal and cultural issues			responsibility towards environment, society, ethics, health, safety, legal and cultural issues
8	Ethics	PLO8	Dissertation Rubrics Comprehensive Examination	UG/PLO/D/DN UG/PLO/D/CE	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall have plagiarism 15% or below Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%) 100% of the students shall have plagiarism 15% or below

			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% of the students shall qualify the exam.	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	PLO9	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% of the students shall qualify the exam.	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
						Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall
			Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			obtain a grade 'A' or above
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above			

10	Communication	PLO10	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% of the students shall qualify the exam.	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
			Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			
11	Project Management & Finance	PLO11	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A'

								(>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	PLO12	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubrics	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

#### 5.17 BACHELOR'S-Level Programme-

#### **Bachelor of Technology in Electrical & Electronics Engineering**

## 5.17.1 Mission Statement

## ProgrammeMission

"To provide education in the futuristic and emerging frontier areas of Electrical & Electronics Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

## **Programme Educational Objectives (PEOs)**

Programme Educational Objectives

1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products/ solutions as per industry and societal requirements.

2. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.

3. The students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur.

4. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers.

5. The student will have the ability to support and practice independent and life-long learning for professional development.

# 5.17.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

# 5.17.4 Programme Learning Outcomes

Learning C	utcomes
1.	The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Electrical & Electronics Engineering.
2.	The student will identify, formulate research literature and analyze electrical & electronics engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
3.	The student will create solutions for electrical & electronics engineering problems and design system components or processes that meet the specified need with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations.
4.	The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis an interpretation of data and synthesis of information to provide valid conclusions.
5.	The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for engineering practice as per Industrial trends with an understanding of the limitations.
6.	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.
7.	The student will recognize the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts an demonstrate the knowledge if and need for the sustainable development.
8.	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.
9.	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinar settings.
10.	The student will use effective communication to cater to both technical and non-technical audiences.
11.	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
12.	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change and contemporar issues.

# 5.17.5 Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
BACHELOR'S LEVEL PROGR	AMS				
Name of the programme					
Learning Outcome 1	$\checkmark$				
Learning Outcome 2					
Learning Outcome 3					
Learning Outcome 4					
Learning Outcome 5					
Learning Outcome 6					
Learning Outcome 7					

5.17.6 Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs)

Broad-Based					
Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
Learning Outcome 8					
Learning Outcome 9					
Learning Outcome 10				$\checkmark$	
Learning Outcome 11					
Learning Outcome 12					

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	-	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		using concepts of Electrical & Electronics Engineering.	Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, formulate research literature and analyze electrical &	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		electronics engineering problems reaching substantiated	Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

# 5.17.7 Student Learning Assessment for B.Tech in Electrical & Electronics Engineering

		conclusions using first principles of mathematics, natural sciences, and engineering sciences			grade 'A' or above			grade 'A' or above
3	Design/Development of Solutions	The student will create solutions for electrical & electronics engineering problems and design system	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations.	Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
4	Problem Analysis	The student will carry out investigations of problems using	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a

		research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.	Major Project Rubric	UG/PLO/D/P2	'A' (>=75- 100%) Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	grade'A' (>=75-100%) Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for engineering practice as per Industrial trends with an understanding of the limitations.	Comprehensive Examination Major Project Rubric	UG/PLO/D/CE UG/PLO/D/P2	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%) Atleast 40% of the students shall obtain a grade 'A' or above	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75-100%) Atleast 40% of the students shall obtain a grade 'A' or above

6	The Engineer &	The student will	Comprehensive	UG/PLO/D/CE	Atleast 20%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
Ŭ	Society	apply reasoning	Examination	00/1 LO/D/CL	of the	Student Exit Survey		of the
	Boelety	informed by	Enterinitation		students shall			students shall
		contextual			obtain grade			give a
		knowledge to			'A' (>=75-			grade'A'
		assess societal,			100%)			(>=75-100%)
		health, safety,			10070)			(>=75 10070)
		legal and	Major Project Rubric	UG/PLO/D/P2	Atleast 40%	Industry Internship	UG/PLO/ID/ II	Atleast 40%
		cultural issues			of the			of the
		and consequent			students shall			students shall
		responsibilities			obtain a			obtain a
		relevant to the			grade 'A' or			grade 'A' or
		professional			above			above
		engineering						
		practice			100% of the			100% of the
		practice			students shall			students shall
					pursue their			pursue their
					responsibility			responsibility
					towards			towards
					environment,			environment,
					society,			society,
					ethics, health,			ethics, health,
					safety, legal			safety, legal
					and cultural			and cultural
					issues			issues
7	Environment &	The student will	Comprehensive	UG/PLO/D/CE	Atleast 20%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
	Sustainability	recognize the	Examination		of the			of the
		impact of the			students shall			students shall
		professional			obtain grade			give a
		engineering			'A' (>=75-			grade'A'
		solutions in			100%)			(>=75-100%)

		global, economic, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development	Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues
8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice	Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall have plagiarism 15% or below	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%) 100% of the students shall have plagiarism 15% or below

			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			
			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75-100%) Atleast 40% of the students shall
		settings	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			obtain a grade 'A' or above
			Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above			
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10	Communication	The student will use effective communication to cater to both technical and non-technical audiences	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
			Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			

11	Project Management	The student will	Comprehensive Exam	UG/PLO/D/CE	Atleast 20%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
	& Finance	demonstrate			of the			of the
		knowledge and			students shall			students shall
		understanding of			obtain grade			give a
		the engineering			'A' (>=75-			grade'A'
		and management			100%)			(>=75-100%)
		principles and			100707			(> 10 100/0)
		apply these to	Major Project Rubric	UG/PLO/D/P2		Industry Internship	UG/PLO/ID/II	Atleast 40%
		one's own work,	0 0		Atleast 40%			of the
		as a member and			of the			students shall
		leader in a team			students shall			obtain a
		as well as to			obtain a			grade 'A' or
		manage projects			grade 'A' or			above
		in			above			
		multidisciplinary						
		environments						
		environments						
12	Lifelong Learning	The student will	Comprehensive Exam	UG/PLO/D/CE	Atleast 20%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
		recognise the	-		of the	-		of the
		need for, and			students shall			students shall
		will engage in			obtain grade			give a
		independent and			'A' (>=75-			grade'A'
		life-long			100%)			(>=75-100%)
		learning in the			,			( ··· ···,
		broadest context	Major Project Rubric	UG/PLO/D/P2	Atleast 40%	Industry Internship	UG/PLO/ID/II	Atleast 40%
		of technological			of the			of the
		change			students shall			students shall
					obtain a			obtain a
					grade 'A' or			grade 'A' or
					above			above

#### 5.18 Bachelor of Technology in Electronics & Instrumentation Engineering

#### 5.18. 1 Mission Statement

#### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Electronics & Instrumentation Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

#### **5.18.2** Programme Educational Objectives (PEOs)

#### **Educational Goals**

1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products/ solutions as per industry and societal requirements.

2. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.

3. The students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur.

4. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers.

5. The student will have the ability to support and practice independent and life-long learning for professional development.

#### 5.18.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

# 5.18.4 Programme Learning Outcomes

1.	The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Electronics & Instrumentation Engineering.
2.	The student will identify, formulate research literature and analyze Electronics & Instrumentation engineering problems reachin substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
3.	The student will create solutions for Electronics & Instrumentation engineering problems and design system components or processe that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations
4.	The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
5.	The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for engineering practice as per the Industrial trends with an understanding of the limitations.
6.	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues an consequent responsibilities relevant to the professional engineering practice.
7.	The student will recognize the impact of the professional engineering solutions in political, global, economic, societal an environmental contexts and demonstrate the knowledge if and need for the sustainable development.
8.	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice
9.	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a commo goal in multidisciplinary settings.
10.	The student will use effective communication to cater to both technical and non-technical audiences.
11.	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.

12.	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological
	change and contemporary issues.

# 5.18.5 Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.

Operational Outcomes									
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.								
12	The faculty will support all the students for quality placements or join family business or start their own venture.								

# 5.18.6 Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs)

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5		
BACHELOR'S LEVEL PROGR	BACHELOR'S LEVEL PROGRAMS						
Name of the programme							
Learning Outcome 1							
Learning Outcome 2	$\checkmark$						

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
Learning Outcome 3	$\checkmark$				
Learning Outcome 4					
Learning Outcome 5					
Learning Outcome 6		$\checkmark$			
Learning Outcome 7		$\checkmark$			
Learning Outcome 8			$\checkmark$		
Learning Outcome 9					
Learning Outcome 10					
Learning Outcome 11					
Learning Outcome 12					

# 5.18.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will apply knowledge of mathematics, sciences and engineering to solve problems	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		using concepts of Electronics & Instrumentation Engineering.	Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, formulate research literature and analyze Electronics &	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		Instrumentation Engineering problems reaching substantiated conclusions	Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

		using first principles of mathematics, natural sciences, and engineering sciences			grade 'A' or above			grade 'A' or above
3	Design/Development of Solutions	The student will create solutions for Electronics & Instrumentation Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental	Comprehensive Examination Major Project Rubric	UG/PLO/D/CE UG/PLO/D/P2	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%) Atleast 40% of the students shall obtain a grade 'A' or above	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75-100%) Atleast 40% of the students shall obtain a grade 'A' or above
4	Problem Analysis	Considerations. The student will carry out investigations of problems using	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a

		research-based knowledge and research methods			'A' (>=75- 100%)			grade'A' (>=75-100%)
		including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.	Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	The student will create, select and apply appropriate techniques, resources and modern	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		engineering and IT tools, necessary for engineering practice as per the Industrial trends with an understanding of the limitations.	Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

6	The Engineer &	The student will	Comprehensive	UG/PLO/D/CE	Atleast 20%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
, C	Society	apply reasoning	Examination		of the	Student Exit Bullyey		of the
	boelety	informed by	Examination		students shall			students shall
		contextual			obtain grade			give a
		knowledge to			'A' (>=75-			grade'A'
		assess societal,			100%)			(>=75-100%)
		health, safety,			10070)			(>=75-10070)
		legal and	Major Project Rubric	UG/PLO/D/P2	Atleast 40%	Industry Internship	UG/PLO/ID/ II	Atleast 40%
		cultural issues	5 5		of the	<b>v</b> 1		of the
		and consequent			students shall			students shall
		responsibilities			obtain a			obtain a
		relevant to the			grade 'A' or			grade 'A' or
		professional			above			above
		engineering						
					100% of the			100% of the
		practice			students shall			students shall
					pursue their			pursue their
					responsibility			responsibility
					towards			towards
					environment,			environment,
					society,			society,
					ethics, health,			ethics, health,
					safety, legal			safety, legal
					and cultural			and cultural
					issues			issues
7	Environment &	The student will	Comprehensive	UG/PLO/D/CE	Atleast 20%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
	Sustainability	recognize the	Examination		of the			of the
		impact of the			students shall			students shall
		professional			obtain grade			give a
		engineering			'A' (>=75-			grade'A'
		solutions in			100%)			(>=75-100%)

		global, economic, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development	Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues
8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice	Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall have plagiarism 15% or below	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%) 100% of the students shall have plagiarism 15% or below

			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			
			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75-100%) Atleast 40% of the students shall
		settings	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			obtain a grade 'A' or above

			Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above			
10	Communication	The student will use effective communication to cater to both technical and non-technical audiences	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
			Major Project Rubric	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
			Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			

11	Project Management	The student will	Comprehensive Exam	UG/PLO/D/CE	Atleast 20%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
	& Finance	demonstrate			of the			of the
		knowledge and			students shall			students shall
		understanding of			obtain grade			give a
		the engineering			'A' (>=75-			grade'A'
		and management			100%)			(>=75-100%)
		principles and			100707			(> 10 100/0)
		apply these to	Major Project Rubric	UG/PLO/D/P2		Industry Internship	UG/PLO/ID/II	Atleast 40%
		one's own work,	0 0		Atleast 40%			of the
		as a member and			of the			students shall
		leader in a team			students shall			obtain a
		as well as to			obtain a			grade 'A' or
		manage projects			grade 'A' or			above
		in			above			
		multidisciplinary						
		environments						
		environments						
12	Lifelong Learning	The student will	Comprehensive Exam	UG/PLO/D/CE	Atleast 20%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
		recognise the	-		of the	-		of the
		need for, and			students shall			students shall
		will engage in			obtain grade			give a
		independent and			'A' (>=75-			grade'A'
		life-long			100%)			(>=75-100%)
		learning in the			,			( ··· ···,
		broadest context	Major Project Rubric	UG/PLO/D/P2	Atleast 40%	Industry Internship	UG/PLO/ID/II	Atleast 40%
		of technological			of the			of the
		change			students shall			students shall
					obtain a			obtain a
					grade 'A' or			grade 'A' or
					above			above

### 5.19 Master's-Level Programme-

### Master of Technology in Power Systems

#### **5.19.1** Mission Statement

#### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Power Systems as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

#### **5.19.2 Programme Educational Objectives (PEOs)**

1.	The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products through research and provide solutions as per industry and societal requirements.
2.	The students shall have the ability to apply research knowledge and methods to solve engineering problems
3.	The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.
4.	Students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur
5.	The student will have the ability to support and practice independent and life-long learning for professional development.
6.	Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers

# 5.19.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

# 5.19.4 Programme Learning Outcomes

ogramm	e Learning Outcomes
1.	The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Power Systems Engineering.
2.	The student will identify, formulate research literature and analyze Power Systems Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
3.	The student will create solutions for Power Systems Engineering problems and design system components or processe that meet the specified needs with appropriate consideration for the public health and safety, economical, cultura societal, and environmental considerations
4.	The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
5.	The student will create, select and apply appropriate techniques, resources and modern engineering and IT too necessary for engineering practice as per the Industrial trends with an understanding of the limitations.
6.	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultur issues and consequent responsibilities relevant to the professional engineering practice.
7.	The student will recognize the impact of the professional engineering solutions in political, global, economic, societ and environmental contexts and demonstrate the knowledge if and need for the sustainable development.
8.	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineerin practice.
9.	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake common goal in multidisciplinary settings.
10.	The student will use effective communication to cater to both technical and non-technical audiences.

11.	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
12.	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change and contemporary issues

# 5.19.5Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

5.19.6 Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs)

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
MASTER'S LEVEL PROGRAM	IS					
Name of the programme						
Learning Outcome 1		$\checkmark$				
Learning Outcome 2		$\checkmark$				
Learning Outcome 3	$\checkmark$	$\checkmark$				
Learning Outcome 4		$\checkmark$				
Learning Outcome 5	V	$\checkmark$				
Learning Outcome 6			$\checkmark$			

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
Learning Outcome 7						
Learning Outcome 8				V		
Learning Outcome 9						
Learning Outcome 10						
Learning Outcome 11						
Learning Outcome 12						

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will apply knowledge of mathematics, sciences and engineering to solve problems	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		using concepts of Power System engineering.	Dissertation Rubric	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, formulate research literature and analyze Power System	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		engineering problems reaching substantiated	Dissertation Rubric	UG/PLO/D/DN	Atleast 40% of the students shall obtain a	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

# 5.19.7 Student Learning Assessment for M.Tech Power Systems

		conclusions using first principles of mathematics, natural sciences, and engineering sciences			grade 'A' or above			grade 'A' or above
3	Design/Development of Solutions	The student will create solutions for Power System engineering problems and design system	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		components or processes that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations	Dissertation Rubric	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

4	Problem Analysis	The student	Comprehensive Examination	UG/PLO/D/C	Atleast 20% of	Student Exit	UG/PLO/ID/	Atleast 85%
		will carry out	-	Е	the students	Survey	ES	of the
		investigations			shall obtain			students shall
		of problems			grade 'A'			give a
		using research-			(>=75-100%)			grade'A'
		based						(>=75-
		knowledge and						100%)
		research						
		methods				Industry	UG/PLO/ID/ II	Atleast 40%
		including				Internship		of the
		design of	Dissertation Rubric	UG/PLO/D/D	Atleast 40% of			students shall
		experiments,		Ν	the students			obtain a
		analysis and			shall obtain a			grade 'A' or
		interpretation			grade 'A' or			above
		of data and			above			
		synthesis of						
		information to						
		provide valid						
		conclusions						
			~			~		
5	Modern Tool	The student	Comprehensive Examination	UG/PLO/D/C	Atleast 20% of	Student Exit	UG/PLO/ID/	Atleast 85%
	Usage	will create,		E	the students	Survey	ES	of the
		select and			shall obtain			students shall
		apply			grade 'A'			give a
		appropriate			(>=75-100%)			grade'A'
		techniques,						(>=75-
		resources and						100%)

		modern	Dissertation Rubric	UG/PLO/D/D	Atleast 40% of	Industry	UG/PLO/ID/ II	Atleast 40%
		engineering	Dissertation Rubite	N	the students	Internship		of the
		and IT tools		11	shall obtain a	internomp		students shall
		including			grade 'A' or			obtain a
		prediction and			above			grade 'A' or
		modelling to			40010			above
		different power						ubbve
		system						
		engineering						
		activities as per						
		the Industrial						
		trends with an						
		understanding						
		of the						
		limitations.						
6	The Engineer &	The student	Comprehensive Examination	UG/PLO/D/C	Atleast 20% of	Student Exit	UG/PLO/ID/	Atleast 85%
	Society	will apply		E	the students	Survey	ES	of the
		reasoning			shall obtain			students shall
		informed by			grade 'A'			give a
		contextual			(>=75-100%)			grade'A'
		knowledge to						(>=75-
		assess societal,						100%)
		health, safety,						
		legal and	Dissertation Rubric	UG/PLO/D/D	Atleast 40% of	Industry	UG/PLO/ID/ II	Atleast 40%
		cultural issues		Ν	the students	Internship		of the
		and consequent			shall obtain a			students shall
		responsibilities			grade 'A' or			obtain a
		relevant to the			above			grade 'A' or
		professional			100% of the			above
		engineering			students shall			100% of the
		practice			pursue their			students shall
					responsibility			pursue their
					responsionity			Pursue men

					towards environment, society, ethics, health, safety, legal and cultural issues			responsibilit y towards environment, society, ethics, health, safety, legal and cultural issues
7	Environment & Sustainability	The student will recognize the impact of the professional engineering solutions in societal and	Comprehensive Examination	UG/PLO/D/C E	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		environmental contexts and demonstrate the knowledge if and need for the sustainable development	Dissertation Rubric	UG/PLO/D/D N	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety,	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibilit y towards environment, society, ethics, health,

					legal and cultural issues			safety, legal and cultural issues
8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice	Dissertation Rubric Comprehensive Exam	UG/PLO/D/D N UG/PLO/D/C E Framework	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall have plagiarism 15% or below Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade A' (>=75- 100%) 100% of the students shall have plagiarism 15% or below
			Behavioural Science Rubrics	UG/PLO9/D/ BS	Atleast 85% students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader of team	Foreign Business Language Rubrics	UG/PLO9/D/ F BL	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		assembled to undertake a common goal in	Comprehensive Exam	UG/PLO/D/C	Atleast 20% of	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a
		multidisciplina ry settings	Comprehensive Exam	E	the students shall obtain grade 'A' (>=75-100%)			grade 'A' or above
			Dissertation Rubric	UG/PLO/D/D N	Atleast 40% of the students shall obtain a grade 'A' or above			
10	Communication	The student will use effective communication to cater to both technical and	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)

		non-technical audiences	Dissertation Rubric	UG/PLO/D/D N	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
			Comprehensive Exam	UG/PLO/D/C E	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)			
11	Project Management & Finance	The student will demonstrate knowledge and understanding of the engineering and	Comprehensive Exam	UG/PLO/D/C E	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplina	Dissertation Rubric	UG/PLO/D/D N	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

		ry environments						
12	Lifelong Learning	The student will recognise the need for, and will engage in independent and life-long learning in the	Comprehensive Exam	UG/PLO/D/C E	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		broadest context of technological change	Dissertation Rubric	UG/PLO/D/D N	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

### Master of Technology in Control Systems

#### **5.20.1**Mission Statement

#### **ProgrammeMission**

"To provide education in the futuristic and emerging frontier areas of Electrical Engineering and Control Systems as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

#### **5.20.2 Programme Educational Objectives (PEOs)**

### **Educational Goals**

- 1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products through research and provide solutions as per industry and societal requirements.
- 2. The students shall have the ability to apply research knowledge and methods to solve engineering problems
- 3. The students shall have the ability to examine the impact of engineering solutions in societal, health, safety, legal, cultural and environmental contexts.
- 4. Students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur
- 5. The student will have the ability to support and practice independent and life-long learning for professional development.
- 6. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers

# 5.20.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

# 5.20.4 Programme Learning Outcomes

P	rogramme Learning Outcomes
1.	The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Control System Engineering.
2.	The student will identify, formulate research literature and analyze Control Systems Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
3.	The student will create solutions for Control Systems Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations
4.	The student will carry out investigations of problems using research-based knowledge and research methods including design o experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
5.	The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for engineering practice as per the Industrial trends with an understanding of the limitations.
6.	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issue and consequent responsibilities relevant to the professional engineering practice.
7.	The student will recognize the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development.
8.	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.
9.	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.
10	The student will use effective communication to cater to both technical and non-technical audiences.
11	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
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12	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change and contemporary issues.

## 5.20.5 Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
MASTER'S LEVEL PROGRAM	IS					
Name of the programme						
Learning Outcome 1		$\checkmark$				
Learning Outcome 2		$\checkmark$				
Learning Outcome 3		$\checkmark$				
Learning Outcome 4		$\checkmark$				
Learning Outcome 5		$\checkmark$				
Learning Outcome 6			$\checkmark$			

**5.20.6** Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs)

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5	PEO 6
Learning Outcome 7						
Learning Outcome 8				V		
Learning Outcome 9						
Learning Outcome 10						
Learning Outcome 11						
Learning Outcome 12						

# 5.20.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will apply knowledge of mathematics, sciences and engineering to solve problems	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		using concepts of Control system engineering	Dissertation Rubric	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, formulate research literature and analyze Control system	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		engineering problems reaching substantiated conclusions	Dissertation Rubric	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Summer Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

		using first principles of mathematics, natural sciences, and engineering sciences						grade 'A' or above
3	Design/Development of Solutions	The student will create solutions for Control system engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations	Comprehensive Examination Dissertation Rubric	UG/PLO/D/CE UG/PLO/D/DN	Atleast 20% of the students shall obtain grade 'A' (>=75-100%) Atleast 40% of the students shall obtain a grade 'A' or above	Student Exit Survey Summer Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75-100%) Atleast 40% of the students shall obtain a grade 'A' or above

4	Problem Analysis	The student will carry out investigations of problems using research-based knowledge and research methods including design	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions	Dissertation Rubric	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools including	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		prediction and modelling to different control system engineering activities as per the Industrial trends with an	Dissertation Rubric	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

		understanding of the limitations.						
6	The Engineer & Society	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		issues and consequent responsibilities relevant to the professional engineering	Dissertation Rubric	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
		practice			students shall pursue their responsibility towards environment, society, ethics,			100% of the students shall pursue their responsibilit y towards environment,
					health, safety, legal and cultural issues			society, ethics, health, safety, legal

								and cultural issues
7	Environment & Sustainability	The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and	Comprehensive Examination Dissertation Rubric	UG/PLO/D/CE UG/PLO/D/DN	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40%
		demonstrate the knowledge if and need for the sustainable development			the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibilit y towards environment, society, ethics, health, safety, legal and cultural issues

8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice	Dissertation Rubric	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall have plagiarism 15% or below	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%) 100% of the students shall have plagiarism
			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)			15% or below
			Behavioural Science Rubrics	UG/PLO9/D/B S	Atleast 85% students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)

		common goal in multidisciplinary settings	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
			Dissertation Rubric	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above			
10	Communication	The student will use effective communication to cater to both technical and non- technical audiences	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubric	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

			Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)			
11	Project Management & Finance	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade <sup>•</sup> A' (>=75- 100%)
		apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments	Dissertation Rubric	UG/PLO/D/DN	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Dissertation Rubric	UG/PLO/D/DN	Atleast 40% of the students	Industry Internship	UG/PLO/ID/II	Atleast 40% of the

technological		shall obtain a		students shall
change		grade 'A' or		obtain a
		above		grade 'A' or
				above

#### 5.21 Bachelor's Level Programmes

### B.Tech (Computer Science & Engineering – 3C)

#### **5.21.1 Mission Statement**

#### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Computer Science & Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To provide international exposure and acquaint the students to the global best practices in their field and thus prepare them for global competent workforce. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

#### 5.21.2 Programme Educational Objectives (PEOs)

Programme Educational Objectives

1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products/ solutions as per industry and societal requirements, globally.

2. The students shall have the ability to examine the impact of global engineering solutions in societal, health, safety, legal, cultural and environmental contexts.

3. The students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur.

4. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers.

5. The student will have the ability to support and practice independent and life-long learning for professional development.

## 5.21.3 Programme Operational Objectives

S.No	Operational Goals						
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students						
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research						
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.						
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.						
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.						
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.						
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs						
8	The Programme will create opportunities for international exposure for its students and faculty.						

#### **5.21.4 Programme Learning Outcomes**

Programme Learning Outcomes

1. The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of computer science & engineering.

2. The student will identify, formulate research literature and analyze computer science & engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. The student will create solutions for computer science & engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations.

4. The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

5. The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for computing practices as per the Industrial trends with an understanding of the limitations.

6. The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.

7. The student will recognize the impact of the professional engineering solutions in political, economic, global, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development.

8. The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.

9. The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.

10. The student will use effective communication to cater to both technical and non-technical audiences.

11. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.

12. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change and contemporary issues.

## 5.21.5 Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

#### 5.21.6 PEO's – PLO mapping

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs). The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summarizes of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{$  in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):

Broad-Based Student Learning Goals (PEOs) Programme Learning Outcome (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
BACHELOR'S LEVEL PROGRAMS					
B.TECH					
Learning Outcome 1					
Learning Outcome 2					
Learning Outcome 3	$\checkmark$				
Learning Outcome 4					
Learning Outcome 5	$\checkmark$				
Learning Outcome 6		$\checkmark$			
Learning Outcome 7		$\checkmark$			
Learning Outcome 8			V		
Learning Outcome 9					
Learning Outcome 10				$\checkmark$	

Broad-Based		-			
Student Learning Goals (PEOs) Programme Learning Outcome (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
Learning Outcome 11					
Learning Outcome 12					

# 5.21.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will apply knowledge of mathematics, sciences and engineering to solve problems	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		using concepts of computer science & engineering	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	2 Investigation	The student will identify, formulate research literature and analyze computer	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		science & engineering problems reaching substantiated	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a

		conclusions using first principles of mathematics, natural sciences, and engineering sciences						grade 'A' or above
3	Design/Development of Solutions	The student will create solutions for computer science & engineering problems and design system	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		components or processes that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

4	Problem Analysis	The student will carry out investigations of problems using research-based knowledge and research methods	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	The student will create, select and apply appropriate techniques,	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		resources and modern engineering and IT tools, necessary for computing practices as	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

	The Engineer &	per the Industrial trends with an understanding of the limitations.	Germanhamin		Asland 2007	Student Enit		Atlant 95%
6	The Engineer & Society	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		cultural issues and consequent responsibilities relevant to the professional engineering practice	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health,

								and cultural issues
7	Environment & Sustainability	The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and	Comprehensive Examination Major Project Rubrics	UG/PLO/D/CE UG/PLO/D/P2	Atleast 20% of the students shall obtain grade 'A' (>=75-100%) Atleast 40%	Student Exit Survey	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40%
		demonstrate the knowledge if and need for the sustainable development			of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues

8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall have plagiarism 15% or below	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade A' (>=75- 100%) 100% of the students shall have plagiarism
			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)			15% or below
			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% of the students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% of the students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)

		undertake a common goal in multidisciplinary settings	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
			Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above			
10	Communication	The student will use effective communication to cater to both technical and non-technical audiences	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% of the students shall qualify the exam	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

			Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)			
11	Project Management & Finance	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
			Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students	Industry Internship	UG/PLO/ID/II	Atleast 40% of the

of technological change			shall obtain a grade 'A' or above			students shall obtain a grade 'A' or above
	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

Bachelor's-Level Programme -

**B.Tech (Computer Science & Engineering – International)** 

#### **5.22.1 Mission Statement**

#### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Computer Science & Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To provide opportunity to pursue their education in the best international higher educational institutions to understand new cultures and a discipline from a global perspective. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

#### 5.22.2 Programme Educational Objectives (PEOs)

Programme Educational Objectives

1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products/ solutions as per international industry and societal requirements.

2. The students shall have the ability to examine the impact of global engineering solutions in societal, health, safety, legal, cultural and environmental contexts.

3. The students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur.

4. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers.

5. The student will have the ability to support and practice independent and life-long learning for professional development.

## 5.22.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

#### **5.22.4 Programme Learning Outcomes**

Programme Learning Outcomes

1. The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of computer science & engineering.

2. The student will identify, formulate research literature and analyze computer science & engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. The student will create solutions for computer science & engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations.

4. The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

5. The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for computing practices as per the Industrial trends with an understanding of the limitations.

6. The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.

7. The student will recognize the impact of the professional engineering solutions in political, economic, global, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development.

8. The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.

9. The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.

10. The student will use effective communication to cater to both technical and non-technical audiences.

11. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.

12. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change and contemporary issues.

## 5.22.5 Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

#### 5.22.6 PEO's – PLO mapping

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs). The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summarizes of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{$  in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):

Broad-Based Student Learning Goals (PEOs) Programme Learning Outcome (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
BACHELOR'S LEVEL PROGRAMS					
B.TECH					
Learning Outcome 1					
Learning Outcome 2					
Learning Outcome 3					
Learning Outcome 4	$\checkmark$				
Learning Outcome 5					
Learning Outcome 6		$\checkmark$			
Learning Outcome 7		$\checkmark$			
Learning Outcome 8			V		
Learning Outcome 9					
Learning Outcome 10				V	

Broad-Based		-			
Student Learning Goals (PEOs) Programme Learning Outcome (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
Learning Outcome 11					
Learning Outcome 12					V

# 5.22.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will apply knowledge of mathematics, sciences and engineering to solve problems	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		using concepts of computer science & engineering	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will identify, formulate research literature and analyze computer	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		science & engineering problems reaching substantiated	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a
		conclusions using first principles of mathematics, natural sciences, and engineering sciences						grade 'A' or above
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3	Design/Development of Solutions	The student will create solutions for computer science & engineering problems and design system	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		components or processes that meet the specified needs with appropriate consideration for the public health and safety, cultural, societal, and environmental considerations	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

4	Problem Analysis	The student will carry out investigations of problems using research-based knowledge and research methods	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	The student will create, select and apply appropriate techniques,	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade A' (>=75- 100%)
		resources and modern engineering and IT tools, necessary for computing practices as	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

	The Engineer &	per the Industrial trends with an understanding of the limitations.	Commelversion		Asland 2007	Student Enit		Atlant 95%
6	The Engineer & Society	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		cultural issues and consequent responsibilities relevant to the professional engineering practice	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
		practice			students shall pursue their responsibility towards environment, society, ethics,			100% of the students shall pursue their responsibility towards environment,
					health, safety, legal and cultural issues			society, ethics, health, safety, legal

								and cultural issues
7	Environment & Sustainability	The student will recognize the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the	Comprehensive Examination Major Project Rubrics	UG/PLO/D/CE UG/PLO/D/P2	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%) Atleast 40% of the students shall	Student Exit Survey	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40% of the students shall
		knowledge if and need for the sustainable development			students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues			students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural issues

8	Ethics	The student will apply ethical principles and practice professional ethics and responsibilities	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		and norms of the engineering practice			have plagiarism 15% or below			100% of the students shall have plagiarism
			Comprehensive Exam	UG/PLO/D/CE Framework	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			15% or below
			Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 85% of the students shall qualify the exam	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
9	Individual and Team Work	The student will demonstrate effectiveness as an individual and as a member	Foreign Business Language Rubrics	UG/PLO9/D/F BL	Atleast 85% of the students shall	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A'

			or leader of assemble undertak common g	d to e a					quali exan	ify the n					(>=75- 100%)
			multidiscip setting	-							Industry	Internship	UG/H	PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
10	Communication	use comr to ca tech non-	tudent will effective nunication ter to both nical and -technical diences	Co	Business mmunication Rubrics	UG/PL B		Atleast 85 of the students shall qual the exam		Student Ex	kit Survey	UG/PLO/I	D/ ES	Atleast 859 of the students shall give a grade'A' (>=75- 100%)	
				Major Rubri	Project cs	UG/PL	O/D/P2	Atleast 40 of the students shall obta a grade 'A or above	in	Industry I	nternship	UG/PLO/	ID/II	Atleast 409 of the students shall obtair grade 'A' c above	a
				Comp	rehensive Exam	UG/PLC	D/D/CE	Atleast 20 of the student shall obta	.s						

11	Project Management & Finance	The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to	Comprehensive Exam	UG/PLO/D/CE	grade 'A' (>=75- 100%) Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
12	Lifelong Learning	The student will recognise the need for, and will engage in independent and life-long learning in the broadest context	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		of technological change	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a

			a grade 'A' or above			grade 'A' or above
Major Rubri	r Project ics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

5.23 BACHELOR'S-Level Programme –

## **B.Tech Electronics & Communication Engineering – 3 Continent**

### 5.23.1 Mission Statement

#### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Electronics & Communication Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To provide international exposure and acquaint the students to the global best practices in their field and thus prepare them for global competent workforce. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

## 5.23.2 Programme Educational Objectives (PEOs)

amme Educational Objectives	
1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative	ve products/
solutions as per industry and societal requirements, globally.	
2. The students shall have the ability to examine the impact of global engineering solutions in societal, health, safety, legal, o	cultural and
environmental contexts.	
3. The students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ tea	m member/
leader in diverse teams and as an entrepreneur.	
4. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain	in effective
performance in the professional/entrepreneurial careers.	
5. The student will have the ability to support and practice independent and life-long learning for professional development.	

## 5.23.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme of B.Tech ECE will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs.
8	The Programme will create opportunities for international exposure for its students and faculty.

### **5.23.4 Programme Learning Outcomes**

## Intended Learning Outcomes

1. The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Electronics and Communication Engineering.

2. The student will identify, formulate research literature and analyze Electronics and Communication Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. The student will create solutions for computer science & engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations.

4. The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

5. The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools, necessary for computing practices as per the Industrial trends with an understanding of the limitations.

6. The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.

7. The student will recognize the impact of the professional engineering solutions in political, economic, global, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development.

8. The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice.

9. The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.

10. The student will use effective communication to cater to both technical and non-technical audiences.

11. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.

12. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change and contemporary issues.

## 5.23.5Programme Operational Outcomes

Opera	tional Outcomes
1.	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global
	standards by incorporating feedback from all the stakeholders.
3.	The student will graduate in timely manner.
4.	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5.	The student will earn achievements in inter-university Extra Curricular activities.
6.	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies
	and to contribute to the existing Body of Knowledge.
7.	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8.	The faculty will facilitate cultivation of cross cultural humanitarian values.
9.	The faculty will facilitate joint research collaborations, invite international delegates and speakers for
	seminars and conferences and various other opportunities for global exposure
10.	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve
	prestigious accreditations from various national, international bodies and ranking bodies.
11.	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni
	network and keep the curriculum responsive to industry needs.
12.	The faculty will support all the students for quality placements or join family business or start their own
	venture.

## 5.23.6 Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs)

The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{}$  in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
BACHELOR'S LEVEL PROGR	AMS				
Name of the programme					
Learning Outcome 1					
Learning Outcome 2					
Learning Outcome 3			<u></u>	<u> </u>	
Learning Outcome 4					

Broad-Based Student Learning Goals (PEQs) Intended Student Learning Outcomes (SLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
Learning Outcome 5	$\checkmark$				
Learning Outcome 6					
Learning Outcome 7					
Learning Outcome 8					
Learning Outcome 9				V	
Learning Outcome 10				$\checkmark$	
Learning Outcome 11					
Learning Outcome 12					

5.6.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	The student will demonstrate the knowledge of mathematics, science,	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		engineering fundamentals, and domain knowledge in Electronics and Communication Engineering to the solution of complex engineering problems.	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
2	Investigation	The student will demonstrate an ability to identify, formulate,	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		research literature, and analyze complex engineering problems	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above

3	Design/Development of Solutions	reaching substantiated conclusions using principles of mathematics, natural sciences, and engineering sciences with focus in Electronics and Communication Engineering. The student will demonstrate an ability to design solutions for complex engineering problems and	Comprehensive Examination Major Project Rubrics	UG/PLO/D/CE UG/PLO/D/P2	Atleast 20% of the students shall obtain grade 'A' (>=75-100%) Atleast 40% of the students	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75-100%) Atleast 40% of the students
		design system components or processes that meet the specified needs with appropriate consideration public health and safety,			shall obtain a grade 'A' or above			shall obtain a grade 'A' or above

		economical, cultural, societal, a environmenta consideration						
4	Problem Analysis	The student will demonstrate the research-based knowledge and research methods	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)
		including design and conduct of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
5	Modern Tool Usage	The student will create, select, and apply appropriate techniques,	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75-100%)

		resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	Atleast 40% of the students shall obtain a grade 'A' or above
6	The Engineer & Society	The student will be able to apply reasoning informed by the contextual knowledge to assess societal,	Comprehensive Examination Major Project Rubrics	UG/PLO/D/CE UG/PLO/D/P2	Atleast 20% of the students shall obtain grade 'A' (>=75-100%) Atleast 40% of the students	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade'A' (>=75-100%) Atleast 40% of the students
		health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional			shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment,			shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment,

engineering		society, ethics,		society, ethics,
practice.		health, safety,		health, safety,
1		legal and		legal and
		cultural issues		cultural issues

Environment &	The student	Comprehensive	UG/PLO/D/CE	Atleast 20%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
		-			Student Exit Bull Vey		of the
Sustainaointy	will be able to	Examination					students shall
	understand the						give a
	impact of the			-			grade'A'
	-			<b>`</b>			(>=75-
	*			100%)			<b>`</b>
							100%)
	solutions in	Major Project Rubrics	LIG/PLO/D/P2	Atleast 10%	Industry Internship		Atleast 40%
	political,	Major Project Rubites	00/120/0/12		mediatry merinanip	00/120/10/11	of the
	-						students shall
	-						obtain a
				U			grade 'A' or
	societal and			A of above			above
	environmental			100% of the			above
	contexts. and						100% of the
	,						students shall
				-			pursue their
	e						responsibility
	of, and need for						towards
	sustainable						environment,
	development						society,
	development.						ethics,
							health,
				issues			safety, legal and cultural
							issues
	Environment & Sustainability	Sustainability Sustainability Will be able to understand the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts, and demonstrate the knowledge of, and need for	Sustainability will be able to understand the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable	Sustainability will be able to understand the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable	SustainabilityInto state in will be able to understand the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts, and demonstrate the knowledge of, and need for sustainableExaminationof the students shall obtain grade 'A' (>=75- 100%)Major Project RubricsUG/PLO/D/P2Atleast 40% of the students shall obtain a grade 'A' or above100% of the students shall economic, societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable100% of the students shall pursue their responsibility towards environment, society,	Sustainability will be able to will be able to understand the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. Examination Examination Examination Examination impact of the students shall obtain grade 'A' (>=75- 100%) UG/PLO/D/P2 Atleast 40% of the students shall obtain a grade 'A' or above 100% of the students shall obtain a grade 'A' or above 100% of the students shall pursue their responsibility towards environment, society, ethics, health, safety, legal and cultural	Sustainability Final statum Examination of the students shall obtain grade 'A' (>=75-100%)   will be able to understand the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. Major Project Rubrics UG/PLO/D/P2 Atleast 40% of the students shall obtain a grade 'A' or above Industry Internship UG/PLO/ID/ II

8	Ethics	The student will	Major Project Rubrics	UG/PLO/D/P2	Atleast 40%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
		demonstrate	5 5 6		of the			of the
		ethical			students shall			students shall
		principles and			obtain a grade			give a
		commit to			'A' or above			grade'A'
								(>=75-
		professional			100% of the			100%)
		ethics and			students shall			
		responsibilities			have			100% of the
		and norms of the			plagiarism			students shall
		engineering			15% or below			have
		practice.	Comprehensive Exam	UG/PLO/D/CE	Atleast 20%	-		plagiarism
			Comprehensive Exam	Framework	of the			15% or
				1 funite work	students shall			below
					obtain grade			
					'A' (>=75-			
					100%)			
			Behavioural Science	UG/PLO9/D/BS	Atleast 85%	Industry Internship	UG/PLO/ID/ II	Atleast 40%
			Rubrics		of the			of the
					students shall			students shall
					qualify the			obtain a
					exam.			grade 'A' or
								above
9	Individual and	The student will	Foreign Business	UG/PLO9/D/F	Atleast 85%	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85%
	Team Work	be able to	Language Rubrics	BL	of the			of the
		function			students shall			students shall
		effectively as an						give a
		encent, erg us un						grade'A'

		individual, and as a member or leader in diverse teams, and in multidisciplinary settings.			qualify the exam.	Industry Internship	UG/PLO/ID/ II	(>=75- 100%) Atleast 40% of the students shall
			Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)			obtain a grade 'A' or above
10	Communication	The student will be able to communicate effectively on complex engineering activities with	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 85% of the students shall qualify the exam.	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		the engineering community and with society at large, such as, being able to comprehend and write effective	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry feedback	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above
		reports and design documentation,	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall			

	make effective presentations, and give and receive clear instructions.			obtain grade 'A' (>=75- 100%)			
Project Management & Finance	The student will be able to demonstrate knowledge and understanding of Engineering and Management Principles as an individual, and as a member or leader in diverse teams considering economical and financial factors. Also, The student will be able to participate and succeed in competitive examinations.	Comprehensive Exam Major Project Rubrics	UG/PLO/D/CE UG/PLO/D/P2	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%) Atleast 40% of the students shall obtain a grade 'A' or above	Student Exit Survey Industry feedback	UG/PLO/ID/ ES UG/PLO/ID/II	Atleast 85% of the students shall give a grade'A' (>=75- 100%) Atleast 40% of the students shall obtain a grade 'A' or above

12	Lifelong Learning	The student will understand the need for, and have the preparation and ability to	Comprehensive Exam	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>=75- 100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade'A' (>=75- 100%)
		engage in independent and life-long learning in the broadest context of technological changes and contemporary issues.	Major Project Rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry feedback	UG/PLO/ID/II	Atleast 40% of the students shall obtain a grade 'A' or above

#### 5.24 Bachelor's-Level Programme -

## **B.Tech.**(Civil Engineering – 3 Continent)

## **5.24.1 Mission Statement**

### **Programme Mission**

"To provide education in the futuristic and emerging frontier areas of Civil Engineering as per latest technologies of Industry 4.0 through knowledge, learning, research and innovation. To provide international exposure and acquaint the students to the global best practices in their field and thus prepare them for global competent workforce. To develop the overall personality of students by making them not only excellent Engineering professionals and technocrats but also good individuals with regards for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action"

#### 5.24.2 Programme Educational Objectives (PEOs)

Programme Educational Objectives

1. The students shall have the ability to apply knowledge of science, engineering & technology to design and develop innovative products/ solutions as per industry and societal requirements, globally.

2. The students shall have the ability to examine the impact of global engineering solutions in societal, health, safety, legal, cultural and environmental contexts.

3. The students will be able to practice professional ethics and academic integrity and demonstrate these as an individual/ team member/ leader in diverse teams and as an entrepreneur.

4. Students will be able to demonstrate professional attitudes, effective communication and behavioral skills and sustain effective performance in the professional/entrepreneurial careers.

5. The student will have the ability to support and practice independent and life-long learning for professional development.

# 5.24.3 Programme Operational Objectives

S.No	Operational Goals
1	The Programme will create appropriate teaching learning resources, infrastructure and conducive environment for excellence in teaching, learning, research and professional development of students
2	The Programme will provide Professional development programmes/opportunities to the faculty and staff to regularly upgrade their knowledge and skills and bring excellence in teaching, learning and research
3	The Programme will demonstrate sensitivity to the diverse needs of students and accordingly develop facilities and services.
4	The Programme will continuously strive to build strong industry interaction, alumni networks and empanelment of expertise from industry.
5	The Programme will continually improve the quality of facilities, services, resources and processes with an aim to attain national and international accreditations and institutional ranking.
6	The Programme will arrange all necessary support system for the students to facilitate campus recruitment, higher education or starting their own ventures.
7	The Programme will act ethically to ensure transparency and good governance while discharging various responsibilities to its stakeholders and execution of policies and programs
8	The Programme will create opportunities for international exposure for its students and faculty.

## 5.24.4 Programme Learning Outcomes

Intended L	earning Outcomes
1.	The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Civil
	Engineering.
2.	The student will identify, formulate research literature and analyse Civil Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3.	The student will create solutions for engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations.
4.	The student will carry out investigations of problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions
5.	The student will create, select and apply appropriate techniques, resources and modern engineering and Civil Engineering tools, necessary for engineering practice as per the Industrial trends with an understanding of the limitations.
6.	The student will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice.
7.	The student will recognize the impact of the professional engineering solutions in political, global, economic, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development.
8.	•
9.	The student will demonstrate effectiveness as an individual and as a member or leader of team assembled to undertake a common goal in multidisciplinary settings.
10	. The student will use effective communication to cater to both technical and non-technical audiences.
11	. The student will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team as well as to manage projects in multidisciplinary environments.
12	. The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change and contemporary issues

# 5.24.5 Programme Operational Outcomes

Ope	erational Outcomes
1	The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development.
2	The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders.
3	The student will graduate in timely manner.
4	The student and faculty shall have academic facilities, technological resources for teaching and learning.
5	The student will earn achievements in inter-university Extra Curricular activities.
6	The faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7	The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice.
8	The faculty will facilitate cultivation of cross cultural humanitarian values.
9	The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure
10	The faculty will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.

Op	erational Outcomes
11	The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs.
12	The faculty will support all the students for quality placements or join family business or start their own venture.

## 5.24.6 PEO's – PLO mapping

Mapping of Intended Programme Learning Outcomes to Broad-Based Programme Educational Objectives (PEOs) The broad-based student learning goals identified in Section I above encompass the intended student learning outcomes as articulated in this section, and are general composites or summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (Note:  $\sqrt{$  in a given cell of the table indicates the intended learning outcome in that row is associated with the learning goal in that column.):

Broad-Based Program Learning Goals (PEQs) Intended Program Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
BACHELOR'S LEVEL PROGR					

Broad-Based Program Learning Goals (PEQs) Intended Program Learning Outcomes	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
(PLOs)					
Name of the programme: B.Tech					
Learning Outcome 1	$\checkmark$				
Learning Outcome 2					
Learning Outcome 3					
Learning Outcome 4					
Learning Outcome 5					
Learning Outcome 6					
Learning Outcome 7		ν			
Learning Outcome 8					
Learning Outcome 9				$\checkmark$	

Broad-Based Program Learning Goals (PEQs) Intended Program Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
Learning Outcome 10					
Learning Outcome 11				V	
Learning Outcome 12					

## 5.24.7 Student Learning Assessment

S.No	Attributes	PLO's	Direct	Tool No for Direct Assessment	Target Performance	Indirect	Tool No for Indirect Assessment	Target Performance
1	Engineering Knowledge	PLO1	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75-100%)
			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.
2	Investigation	PLO2	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75-100%)

			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.
3	Design/Development of Solutions	PLO3	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75-100%)
			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.

4	Problem Analysis	PLO4	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75-100%)
			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.
5	Modern Tool Usage	PLO5	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75-100%)
			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.

6	The Engineer & Society	PLO6	Comprehensive Examination	UG/PLO/D/CE	the sha grad	ast 20% of students Il obtain le 'A' (>= 5-100%)		udent Exit Survey	UG/PL ES		Atleast 85% the studen shall give grade 'A' ( 75-100%	ts a >=
			Major Project rubrics	UG/PLO/D/P2	the shal grae	ast 40% of students l obtain a de 'A' or above		Industry nternship	UG/PL0 II		40% of the students sha obtain a gra 'A' or abov	de
7	Environment & Sustainbility	PLO7	Comprehensive Examination	on UG/PLO/D	)/CE	Atleast 20 the stude shall obt grade 'A' 75-100	ents tain (>=	Student Exi	t Survey	UG/P	PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75-100%)
			Major Project rubrics	UG/PLO/I	D/P2	Atleast 40 the stude shall obta grade 'A above	ents ain a .' or	Industry In	ternship	UG/I	PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.

0		DI OO		1	1000/ 0 1			<b>CON</b> ( 1 1
8	Ethics	PLO8	Plagiarism		100% Students	Feedback of Industry	UG/PLO/ID/ II	60% students
			Checking of NTCC Report		are checked	Internship Guide		are rated
					for plagiarism			between 4-5
					in NTCC			range on the
					report			Likert Scale in
					submissions			the feedback
					and are			by Industry
					allowed to			guides.
					appear for			0
					vivavoce upon			
					obtaining			
					plagiarism %			
					below 15%.			
					0010 11 10 /01			
			Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of
					the students			the students
					shall obtain			shall give a
					grade 'A' (>=			grade 'A' (>=
					75-100%)			75-100%)
					75 100/07			75 100/07
9	Individual and Team	PLO9	Behavioural Science Rubrics	UG/PLO9/D/BS	Atleast 80% of	Student Exit Survey	UG/PLO/ID/ ES	70% students
	Work				the students			response range
					shall pass the			between 4-5
					exam			on the Likert
								Scale in the
								Student Exit
								Survey.
								Survey.
L				1	1			
				Alumni Survey	UG/PLO/ID/ AS	70% students response range between 4-5 on the Likert Scale in the Alumni Survey.		
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	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75-100%)	Student Exit Survey Industry Internship	UG/PLO/ID/ ES UG/PLO/ID/ II	Atleast 85% of the students shall give a grade 'A' (>= 75-100%)		

			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above			40% of the students shall obtain a grade 'A' or above.
10	Communication	PLO10	Business Communication Rubrics	UG/PLO10/D/ BC	Atleast 80% of the students shall pass the exam	Student Exit Survey	UG/PLO/ID/ ES	70% students response range between 4-5 on the Likert Scale in the Student Exit Survey.
						Alumni Survey	UG/PLO/ID/ AS	70% students response range between 4-5 on the Likert Scale in the Alumni Survey.
			Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75-100%)
			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.

11	Project Management & Finance	PLO11	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of the students shall obtain grade 'A' (>= 75-100%)	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of the students shall give a grade 'A' (>= 75-100%)
			Major Project rubrics	UG/PLO/D/P2	Atleast 40% of the students shall obtain a grade 'A' or above	Industry Internship	UG/PLO/ID/ II	40% of the students shall obtain a grade 'A' or above.

12	Lifelong Learning	PLO12	Comprehensive Examination	UG/PLO/D/CE	Atleast 20% of	Student Exit Survey	UG/PLO/ID/ ES	Atleast 85% of
					the students			the students
					shall obtain			shall give a
					grade 'A' (>=			grade 'A' (>=
					75-100%)			75-100%)

# Section VI

**Domain Operational Outcomes & Operational Outcome Assessment Plan** 

# **6.1 Operational Assessment**

#	Broad-Based Operational Goals	Intended Operational Outcomes for the Domain	Assessment Measures/Methods for Intended Operational Outcomes	Performance Objectives (Targets/Criteria)
1	FET intends to facilitate academically conducive environment and infrastructure to achieve excellence in teaching, learning and research.	<ul> <li>FET will encourage faculty to use appropriate methodology and pedagogical tools for teaching, learning and development of students.</li> <li>The students of FET will graduate in timely manner.</li> </ul>	<ul> <li>Student feedback of course faculty.</li> <li>Faculty qualification and experience files.</li> <li>Graduation rate in convocation report. <ul> <li>on completion of Registration period (N) during extended period (N+1+1 for PG and N+2+1 for UG)</li> </ul> </li> </ul>	<ul> <li>All faculty shall have a minimum criteria of greater than 70% overall score in student feedback.</li> <li>All faculty to be either M.Tech/PhD or shall have industry experience.</li> <li>At least 80% students shall graduate on completion of Registration period (N)</li> </ul>

				• 80% of remaining students shall pass during extended period (N+1+1 for PG and N+2+1 for UG)
2	FET will provide ample opportunities to its students to participate in curricular, co- curricular and extracurricular activities for their holistic development.	• The students of FET will participate in Co-Curricular and Extra Curricular activities	<ul> <li>Functional and area specific club, Committees, Sports Events, co-curricular and extracurricular activities and student's participation in inter institutional competition.</li> <li>List of Award winners</li> </ul>	<ul> <li>Every student shall be a part of at least one Club or Committee or inter institutional competition.</li> </ul>
3	FET will facilitate environment for innovation and research excellence for the intellectual growth of faculty.	• FET shall maintain appropriate academic facilities and technological Resources for teaching and learning.	<ul> <li>Faculty data about Research work and other Scholar activities such as:</li> <li>Scholarship of teaching; published and unpublished articles, manuscripts, books, curriculum review and evaluation of teaching material.</li> <li>Scholarship of Discovery: published articles, manuscripts, papers</li> </ul>	

			<ul> <li>presented, dissertations/ thesis,</li> <li>Scholarship of Integration: published articles, manuscripts, papers presented, dissertations/ thesis, conference and workshops attended.</li> <li>Scholarship of application: published articles, manuscripts, papers presented, consultations, policy analysis, programme evaluation.</li> <li>Professional activities: Routine consulting, conference, workshop, professional meeting attendance, professional membership.</li> </ul>	
4	FET will inculcate core values and ethical conduct amongst students, faculty and staff.	• The FET will integrate ethics and values in teaching, theory and practice, develop and retain excellent students, faculty and staff.	<ul> <li>Attrition Rate</li> <li>Courses embedded in curriculum such as Behavioral Science Courses, Human Values and Community Outreach, etc.</li> <li>Plagiarism check.</li> <li>Feedback system.</li> </ul>	<ul> <li>Attrition rate shall be below 10% annually</li> <li>Faculty Feedback shall be taken for each course.</li> <li>80% faculty shall have 4 or 5 on 5 point Likert Scale.</li> </ul>

5	FET will encourage cultural diversity and a sense of social and environmental responsibility.	• FET will facilitate joint research collaborations; invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure.	<ul> <li>List of community/ social sector projects/ activities/ engagements.</li> <li>Organizing Cultural programmes.</li> <li>Day of Belongingness.</li> <li>Celebration of festivals for culturally diverse group of students.</li> </ul>	• Atlease 80% faculty and students should be engaged in organizing/ participating the various events and activities
6	FET will provide ample opportunities for international exposure to faculty and students.		<ul> <li>Study Abroad Programme</li> <li>Exchange Programs for students.</li> <li>Conferences/ Seminars organized by national and international speakers and delegates.</li> <li>Collaborative Research.</li> </ul>	• 100% students and faculty of FET shall be offered an opportunity for international exposure through various programs designed for the purpose.
7	FET will be involved in continual improvement of processes and systems and aim to attain national and international accreditations and university rankings.	• The curriculum is contemporary, developed in collaborative consultation with all the stakeholders, benchmarked with global standards and relevant to the industry requirements	<ul> <li>Ranking in national and international ranking agencies.</li> <li>Accreditation at institutions and programme levels.</li> </ul>	<ul> <li>Continuous review and enhancement of all the required systems and processes to upgrade/ maintain high standards</li> </ul>

8	FET will build a strong industry interaction by way of alumni networks and empanelment of expertise from industry. FET will facilitate employment opportunities and also support students to start their own	<ul> <li>FET will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies</li> <li>FET will develop and maintain strong relationship with corporate and support all the students for quality placements or join family business or start their own venture.</li> </ul>
10	ventures. FET will facilitate good governance in discharge of responsibilities and execution of policies and programs.	<ul> <li>FET will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies.</li> </ul>

### 6.2 Operational Outcomes

	Intended Operational Outcomes
1.	FET will encourage faculty to use appropriate methodology and pedagogical tools for teaching, learning and development of students.
2.	The curriculum is contemporary, developed in collaborative consultation with all the stakeholders, benchmarked with global standards and relevant to the industry requirements.
3.	The students of FET will graduate in timely manner.
4.	FET shall maintain appropriate academic facilities and technological Resources for teaching and learning.
5.	The students of FET will participate in Co Curricular and Extra Curricular activities.
6.	Faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.
7.	The FET will integrate ethics and values in teaching, theory and practice, develop and retain excellent students, faculty and staff.

8.	FET will facilitate joint research collaborations; invite international delegates and speakers for seminars and conferences and
	various other opportunities for global exposure.
9.	FET will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious
	accreditations from various national, international bodies and ranking bodies.
10.	FET will develop and maintain strong relationship with corporate and support all the students for quality placements or join
	family business or start their own venture.

### 6.3 Operational Outcome Assessment Plan

• Faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge.

### Section VII

Linkage of Outcomes Assessment with Strategic Planning

Provide a narrative that describes the ways in which the results from implementing your outcomes assessment plan (i.e., changes and improvements needed) are linked to the strategic planning processes of the academic business unit and the institution.

#### **Faculty of Engineering & Technology**

- Goals set by University Planning Committee
- Objectives with high priority in strategic planning for desired outcomes

#### STRATEGIC PROCESS OF CONTINUOUS IMPROVEMENTS

