

U T T A R P R A D E S H

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| Outcome Assessment Plan | |
| **Domain:** | Engineering & Technology |
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| 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 yearsto 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 21st century ahead of them.

There are a number of challenges being faced by science and engineering professionals in the on-going 21st 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 variousprogrammes 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 wellfor 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 orto 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 Technologyknowledge tocomprehend, analyze, design & create novel products and solutions for real life problems;

4)      *Professionalism:*To inculcate in the students professional/ethical attitude, effectiveteam 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 ofexcellence, 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:
   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. **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:
   1. **Operational Outcomes:** The operational outcomes are defined for the domain and assessed at the domain level
   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.

## 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)**

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# 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-Based Student Educational Goals:** | |
| --- | --- |
|  | Students shall be able to illustrate knowledge of theory and concepts of Engineering & Technology in a professional work setting |
|  | Students shall be able to interpret, examine, formulate, design and create novel products and solutions for real life problems |
|  | Students shall be able to relate Engineering issues to the broader social, legal, cultural and environmental contexts |
|  | Students shall be able to demonstrate effective performance by leveraging Information and Technological competencies in the professional/entrepreneurial careers |
|  | Students shall be able todemonstrate professional attitudes, effective communication and behavioral skills that support and improve individual’s performance |
|  | Students shall be able tocreate technical competence for successful and productive careers or advance studies/research in the field of Engineering & Technology |
|  | 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. |
|  | 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-Based Student Learning Goals at Institutional Level:** | |
| --- | --- |
|  | Students shall be able to illustrate knowledge of theory and concepts of Engineering & Technology in a professional work setting |
|  | Students shall be able to interpret, examine, formulate, design and create novel products and solutions for real life problems |
|  | Students shall be able to relate Engineering issues to the broader social, legal, cultural and environmental contexts |
|  | Students shall be able to demonstrate effective performance by leveraging Information and Technological competencies in the professional/entrepreneurial careers |
|  | Students shall be able to demonstrate professional attitudes, effective communication and behavioral skills that support and improve individual’s performance |
|  | Students shall be able to create technical competence for successful and productive careers or advance studies/research in the field of Engineering & Technology |
|  | 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. |
|  | 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**

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| --- |
| **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**

| **Operational 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 summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (**Note:** √ **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 | √ |  |  |  |  |
|  | Learning Outcome 5 | √ |  |  |  |  |
|  | Learning Outcome 6 |  | √ |  |  |  |
|  | Learning Outcome 7 |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  | √ |  |
|  | 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 using concepts of computer 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%) |
| 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 science & engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | 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 | Atleast 40% of the students shall obtain a grade ‘A’ or above |
| 3 | Design/Development of Solutions | 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 | 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 | 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 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 | | 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 ‘A’ or above |
| Comprehensive Examination | | UG/PLO/D/CE | | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) | |
| 5 | | Modern Tool Usage | | 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. | | 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 | Atleast 40% of the students shall obtain a grade ‘A’ or above |
| 6 | | The Engineer & Society | | 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 | | 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  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 demonstrate the knowledge if and need for the sustainable development | | 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  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 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 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% 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 undertake a common goal in multidisciplinary settings | | 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 obtain a grade ‘A’ or above |
| Comprehensive Exam | | UG/PLO/D/CE | | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) | |
| 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 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 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 | | 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 technological change | | 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 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 |
| 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 |

### M.Tech (Computer Science & Engineering)

## **5.2.1 Mission Statement**

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| --- |
| **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**

|  |  |
| --- | --- |
| 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 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, 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 |

**5.2.5** **Programme Operational Outcomes**

| **Operational 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**

## 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:** √ **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)  Intended  Student  Learning Outcomes  (SLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO  5 | PEO  6 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **MASTER’s Level Programs** | | | | |  |  |  |
| *Name of the programme* | | | | |  |  |  |
|  | Learning Outcome 1 | √ | √ |  |  |  |  |
|  | Learning Outcome 2 | √ | √ |  |  |  |  |
|  | Learning Outcome 3 | √ | √ |  |  |  |  |
|  | Learning Outcome 4 | √ | √ |  |  |  |  |
|  | Learning Outcome 5 | √ | √ |  |  |  |  |
|  | Learning Outcome 6 |  |  | √ |  |  |  |
|  | Learning Outcome 7 |  |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  |  | √ |  |
|  | 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 using concepts of computer science & 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%) |
| 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 science & engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | 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 | Design/Development of Solutions | 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 | 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 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4 | | Problem Analysis | | 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 | | 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 | 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” | |
| 5 | | Modern Tool Usage | | 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 | | 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 | | 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 | | 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’  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 demonstrate the knowledge if and need for the sustainable development | | 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’  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 | | 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 plagiarism 15% or below |
| Comprehensive Exam | | UG/PLO/D/CE Framework | | Atleast 40% of the students shall obtain grade ‘A’ (>=75-100%) | |
| 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 undertake a common goal in multidisciplinary settings | | 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%) |
| 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%) | |
| 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 | 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%) |
| 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 of technological change | | 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 marked “Satisfactory” | | Industry Internship | | UG/PLO/ID/II | | Atleast 40% of the students shall obtain a 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**

|  |
| --- |
| **Programme Learning Outcomes** |
| 1. The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Computer Science & Information Technology |
| 1. 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. |
| 1. 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. |
| 1. 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 |
| 1. 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. |
| 1. 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. |
| 1. 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. |
| 1. The student will apply ethical principles and practice professional ethics and responsibilities and norms of the engineering practice. |
| 1. 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. The student will use effective communication to cater to both technical and non-technical audiences. |
| 1. 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. |
| 1. 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**

| **Operational 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. |

**5.3.6 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:** √ **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)  Intended  Programme Learning Outcomes  (PLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO 5 |
| --- | --- | --- | --- | --- | --- | --- |
| **Bachelor’s Level Programs** | | | | |  |  |
| *Name of the programme: B.Tech (Information Technology)* | | | | |  |  |
|  | Learning Outcome 1 | √ |  |  |  |  |
|  | Learning Outcome 2 | √ |  |  |  |  |
|  | Learning Outcome 3 | √ |  |  |  |  |
|  | Learning Outcome 4 | √ |  |  |  |  |
|  | Learning Outcome 5 | √ |  |  |  |  |
|  | Learning Outcome 6 |  | √ |  |  |  |
|  | Learning Outcome 7 |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  | √ |  |
|  | Learning Outcome 12 |  |  |  |  | √ |

**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 using concepts of Computer Science & Information Technology | 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 | Atleast 40% of the students shall obtain a grade ‘A’ or above |
| 2 | Investigation | 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 | 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 | Atleast 40% of the students shall obtain a 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 meet the specified needs with appropriate consideration for the public health and safety, economical, cultural, societal, and environmental considerations | 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 | 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 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%) | | 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 ‘A’ or above |
| Major Project Rubrics | | UG/PLO/D/P2 | | 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 computing practice as per the Industrial trends with an understanding of the limitations. | | 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 | Atleast 40% of the students shall obtain a grade ‘A’ or above |
| 6 | | The Engineer & Society | | 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. | | 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  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 political, global, economic, societal and environmental contexts to demonstrate the knowledge and the need for the sustainable development. | | 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  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 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 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 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 ‘A’ or above |
| Comprehensive Exam | | UG/PLO/D/CE | | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) | |
| 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 one’s own work, as a member and leader in a team as well as to manage projects effectively in multidisciplinary environments. | | 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 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 change and contemporary issues. | | 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 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 |
| 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. 4 Master’s-Level Programme - M.Tech.(Computer Network & Information Security)

## **5.4.1 Mission Statement**

|  |
| --- |
| **Programme Mission** |
| “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)

|  |  |
| --- | --- |
| 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 |

**5.4.3 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. |
| 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. |

5.4.4 Programme Learning Outcomes

|  |  |
| --- | --- |
| Intended 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 **Computer Network & Information Security** problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. 3. Student will create solutions for complex **Computer Network & Information Security** 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. 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. Student will create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to different computer science & engineering activities as per the Industrial trends with an understanding of the limitations 6. 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. Student will recognize the impact of the professional **Computer Network & Information Security** solutions in societal and environmental contexts and demonstrate the knowledge of and need for the sustainable development. 8. Student will apply ethical principles and demonstrate professional ethics, responsibilities and norms of the engineering practice. 9. Student will demonstrate effectiveness as an individual and as a member or leader in teams and in multidisciplinary 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 these to 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 context of technological change. |

5.4.5 **Programme Operational Outcomes**

| **Operational 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. |

**5.4.6 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:** √ **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)  Intended  Programme  Learning Outcomes  (PLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO  5 | PEO  6 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **MASTER’s Level Programs** | | | | |  |  |  |
| *Name of the programme* | | | | |  |  |  |
|  | Learning Outcome 1 | √ | √ |  |  |  |  |
|  | Learning Outcome 2 | √ | √ |  |  |  |  |
|  | Learning Outcome 3 | √ | √ |  |  |  |  |
|  | Learning Outcome 4 | √ | √ |  |  |  |  |
|  | Learning Outcome 5 | √ | √ |  |  |  |  |
|  | Learning Outcome 6 |  |  | √ |  |  |  |
|  | Learning Outcome 7 |  |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  |  | √ |  |
|  | Learning Outcome 12 |  |  |  |  |  | √ |

**5.4.7 Student Learning Assessment for** M.Tech.(Computer Network & Information Security)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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 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%) |
| 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 & Information Security problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. | 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 | Design/Development of Solutions | The student will create solutions for complex Computer Network & Information Security 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 | 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 |
| 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 data, and synthesis of the information to provide valid conclusions. | 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 | 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 |
| 5 | Modern Tool Usage | The student will create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to different computer science & engineering activities as per the Industrial trends with an understanding of the limitations | 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 | 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. | 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 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 contexts and demonstrate the knowledge of and need for the sustainable development. | 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 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 demonstrate professional ethics, responsibilities and norms of the engineering practice. | 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 | UG/PLO/D/CE Framework | Atleast 40% 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 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 ‘A’ or above |
| Comprehensive Exam | UG/PLO/D/CE | Atleast 40% of the students shall obtain grade ‘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 | 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 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 recognise the need for and will engage in independent and life-long learning in the broadest context of technological change. | 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 marked satisfactory | Industry Internship | UG/PLO/ID/II | Atleast 40% of the students shall obtain a grade ‘A’ or above |

### 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. |
| 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. |

**5.5.4 Programme Learning Outcomes**

|  |  |
| --- | --- |
| Intended Learning 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**

| **Operational 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. |

**5.5.6 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:** √ **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 (PEOs)  Intended  Program  Learning Outcomes  (PLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO 5 |
| --- | --- | --- | --- | --- | --- | --- |
| **Bachelor’s Level Programs** | | | | |  |  |
| *Name of the programme: B.Tech* | | | | |  |  |
|  | Learning Outcome 1 | √ |  |  |  |  |
|  | Learning Outcome 2 | √ |  |  |  |  |
|  | Learning Outcome 3 | √ |  |  |  |  |
|  | Learning Outcome 4 | √ |  |  |  |  |
|  | Learning Outcome 5 | √ |  |  |  |  |
|  | Learning Outcome 6 |  | √ |  |  |  |
|  | Learning Outcome 7 |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  | √ |  |
|  | 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 grade ‘A’ or above | Industry Internship | UG/PLO/ID/ II | 40% of the students shall obtain a 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%)  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 | 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 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%) |

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**

|  |
| --- |
| **Operational Outcomes** |
| 1. The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development. |
| 1. The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders. |
| 1. The student will graduate in timely manner. |
| 1. The student and faculty shall have academic facilities, technological resources for teaching and learning. |
| 1. The student will earn achievements in inter-university Extra Curricular activities. |
| 1. 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. |
| 1. The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice. |
| 1. The faculty will facilitate cultivation of cross cultural humanitarian values. |
| 1. The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure.. |
| 1. 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. |
| 1. The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs. |
| 1. The faculty will support all the students for quality placements or join family business or start their own venture. |

**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:** √ **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)  Intended  Student  Learning Outcomes  (SLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO 5 |
| --- | --- | --- | --- | --- | --- | --- |
| **bachelor’s Level Programs** | | | | |  |  |
| *Name of the programme* | | | | |  |  |
|  | Learning Outcome 1 | √ |  |  |  |  |
|  | Learning Outcome 2 | √ |  |  |  |  |
|  | Learning Outcome 3 | √ |  |  |  |  |
|  | Learning Outcome 4 | √ |  |  |  |  |
|  | Learning Outcome 5 | √ |  |  |  |  |
|  | Learning Outcome 6 |  | √ |  |  |  |
|  | Learning Outcome 7 |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  | √ |  |
|  | 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, engineering fundamentals, and domain knowledge in Electronics and Communication Engineering to the solution of complex engineering 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%) |
| 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 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. | 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 | 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 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. | 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 | 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 methods including design and conduct of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. | 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%) |
| 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 |
| 5 | Modern Tool Usage | The student will create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. | 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 | 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, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. | 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  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 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. | 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  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 demonstrate ethical principles and commit to 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 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% 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 be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. | 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 obtain a grade ‘A’ or above |
| Comprehensive Exam | UG/PLO/D/CE | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) |
| 10 | Communication | The student will be able to communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | 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 feedback | 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 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 | 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 feedback | UG/PLO/ID/II | 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 engage in independent and life-long learning in the broadest context of technological changes and contemporary issues. | 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 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**

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| **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. |
| 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. |

**5.7.4 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 Structural Engineering 2. 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 Engineeringproblems 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 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 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. 8. The student will apply ethical principles and demonstrate professional ethics, responsibilities and norms of the engineering practice. 9. The student will demonstrate effectiveness as an individual and as a member or leader in teams and 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. | |

**5.7.5** **Programme Operational Outcomes**

| **Operational 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. |

**5.7.6** 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:** √ **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)  Intended  Student  Learning Outcomes  (SLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO  5 | PEO  6 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **MASTER’s Level Programs** | | | | |  |  |  |
| *M.Tech Structural Engineering* | | | | |  |  |  |
|  | Learning Outcome 1 | √ | √ |  |  |  |  |
|  | Learning Outcome 2 | √ | √ |  |  |  |  |
|  | Learning Outcome 3 | √ | √ |  |  |  |  |
|  | Learning Outcome 4 | √ | √ |  |  |  |  |
|  | Learning Outcome 5 | √ | √ |  |  |  |  |
|  | Learning Outcome 6 |  |  | √ |  |  |  |
|  | Learning Outcome 7 |  |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  |  | √ |  |
|  | 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 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%) |
| 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 & Information Security problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. | 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 | Design/Development of Solutions | The student will create solutions for complex Computer Network & Information Security 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 | 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 |
| 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 data, and synthesis of the information to provide valid conclusions. | 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 | 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 |
| 5 | Modern Tool Usage | The student will create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to different structural engineering activities as per the Industrial trends with an understanding of the limitations | 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 | 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. | 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 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 &Sustainbility | Student will recognize the impact of the professional Computer Network & Information Security solutions in societal and environmental contexts and demonstrate the knowledge of and need for the sustainable development. | 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 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 demonstrate professional ethics, responsibilities and norms of the engineering practice. | 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 | UG/PLO/D/CE Framework | Atleast 40% 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 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 ‘A’ or above |
| Comprehensive Exam | UG/PLO/D/CE | Atleast 40% of the students shall obtain grade ‘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 | 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 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 recognise the need for and will engage in independent and life-long learning in the broadest context of technological change. | 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 marked satisfactory | Industry Internship | UG/PLO/ID/II | Atleast 40% of the students shall obtain a grade ‘A’ or above |

### 5. 8 Master’s-Level Programme-

### M.Tech.(Environmental Engineering)

## **5.8.1 Mission Statement**

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| --- |
| **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. |
| 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. |

**5.8.4 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. 8. The student will apply ethical principles and demonstrate professional ethics, responsibilities and norms of the engineering practice. 9. The student will demonstrate effectiveness as an individual and as a member or leader in teams and 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. |

5.8.5 **Programme Operational Outcomes**

| **Operational 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. |

**5.8.6 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:** √ **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 (PEOs)  Intended  Program  Learning Outcomes  (PLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO 5 |
| --- | --- | --- | --- | --- | --- | --- |
| **Master’s Level Programs** | | | | |  |  |
| *Name of the programme: M.Tech (Environmental Engineering)* | | | | |  |  |
|  | Learning Outcome 1 | √ |  |  |  |  |
|  | Learning Outcome 2 | √ |  |  |  |  |
|  | Learning Outcome 3 | √ |  |  |  |  |
|  | Learning Outcome 4 | √ |  |  |  |  |
|  | Learning Outcome 5 | √ |  |  |  |  |
|  | Learning Outcome 6 |  | √ |  |  |  |
|  | Learning Outcome 7 |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  | √ |  |
|  | Learning Outcome 12 |  |  |  |  | √ |

**5.8.7 Student Learning Assessment for** M.Tech.(Environmental Engineering)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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 | Design/Development of Solutions | 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%) |
| 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 | 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 |
| 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 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 & Sustainbility | 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%) |
| 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 |
| 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 | UG/PLO/D/CE Framework | Atleast 40% 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 | PLO9 | 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 ‘A’ or above |
| Comprehensive Exam | UG/PLO/D/CE | Atleast 40% of the students shall obtain grade ‘A’ (>=75-100%) |
| Dissertation Rubrics | UG/PLO/D/DN | Atleast 80% of the students shall be marked satisfactory |
| 10 | Communication | PLO10 | 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 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 marked satisfactory | Industry Internship | UG/PLO/ID/II | Atleast 40% of the students shall obtain a grade ‘A’ or above |

### 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 | 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. |

5.9.4 Programme Learning Outcomes

|  |  |
| --- | --- |
| Intended Learning Outcomes | |
|  | 1. The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of mechanical & 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. 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. |

5.9.5 **Programme Operational Outcomes**

| **Operational 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**

## 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:** √ **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 | √ |  |  |  |  |
|  | Learning Outcome 5 | √ |  |  |  |  |
|  | Learning Outcome 6 |  | √ |  |  |  |
|  | Learning Outcome 7 |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  | √ |  |
|  | 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 using concepts of mechanical & automation 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%) |
| 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 mechanical & automation engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | 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 | Atleast 40% of the students shall obtain a grade ‘A’ or above |
| 3 | Design/Development of Solutions | 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, cultural, societal, and environmental considerations | 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 | 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 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%) | | 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 ‘A’ or above |
| Major Project Rubrics | | UG/PLO/D/P2 | | 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 the Industrial trends with an understanding of the limitations | | 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 | Atleast 40% of the students shall obtain a grade ‘A’ or above |
| 6 | | The Engineer & Society | | 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 | | 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  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 demonstrate the knowledge if and need for the sustainable development | | 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  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 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 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 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 ‘A’ or above |
| Comprehensive Exam | | UG/PLO/D/CE | | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) | |
| 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 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 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 | | 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 technological change | | 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 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. 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)

|  |  |
| --- | --- |
| 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 | |

**5.10.3 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

|  |  |
| --- | --- |
| Intended 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**

| **Operational 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**

## 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:** √ **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 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **MASTER’s Level Programs** | | | | |  |  |  |
| *Name of the programme* | | | | |  |  |  |
|  | Learning Outcome 1 | √ | √ |  |  |  |  |
|  | Learning Outcome 2 | √ | √ |  |  |  |  |
|  | Learning Outcome 3 | √ | √ |  |  |  |  |
|  | Learning Outcome 4 | √ | √ |  |  |  |  |
|  | Learning Outcome 5 | √ | √ |  |  |  |  |
|  | Learning Outcome 6 |  |  | √ |  |  |  |
|  | Learning Outcome 7 |  |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  |  | √ |  |
|  | 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 using concepts of automobile 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%) |
| 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 engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | 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 marks 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 automobile 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 | 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 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 research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions | | 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 | 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 | |
| 5 | | Modern Tool Usage | | 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 of the limitations | | 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 marks 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 contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice | | 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 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 demonstrate the knowledge if and need for the sustainable development | | 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 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 |
| 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 marks 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 plagiarism 15% or below |
| Comprehensive Exam | | UG/PLO/D/CE Framework | | Atleast 40% 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 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 ‘A’ or above |
| Comprehensive Exam | | UG/PLO/D/CE | | Atleast 40% of the students shall obtain grade ‘A’ (>=75-100%) | |
| 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 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%) |
| 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 of technological change | | 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 marks satisfactory | | Industry Internship | | UG/PLO/ID/II | | Atleast 40% of the students shall obtain a grade ‘A’ or above |

### 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

|  |  |
| --- | --- |
| Intended Learning Outcomes | |
|  | * 1. The student will apply knowledge of mathematics, sciences and engineering to solve complex problems using concepts of industrial & production engineering.   2. The student will identify, formulate research literature and analyze complex industrial & production 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 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 |

5.11.5 **Programme Operational Outcomes**

| **Operational 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**

## 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:** √ **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 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **MASTER’s Level Programs** | | | | |  |  |  |
| *Name of the programme* | | | | |  |  |  |
|  | Learning Outcome 1 | √ | √ |  |  |  |  |
|  | Learning Outcome 2 | √ | √ |  |  |  |  |
|  | Learning Outcome 3 | √ | √ |  |  |  |  |
|  | Learning Outcome 4 | √ | √ |  |  |  |  |
|  | Learning Outcome 5 | √ | √ |  |  |  |  |
|  | Learning Outcome 6 |  |  | √ |  |  |  |
|  | Learning Outcome 7 |  |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  |  | √ |  |
|  | 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 using concepts of industrial & production 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%) |
| 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 & production engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | 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 marks 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 automobile 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 | 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 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 research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions | | 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 | 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 | |
| 5 | | Modern Tool Usage | | 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 of the limitations | | 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 marks 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 contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice | | 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 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 demonstrate the knowledge if and need for the sustainable development | | 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 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 |
| 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 marks 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 plagiarism 15% or below |
| Comprehensive Exam | | UG/PLO/D/CE Framework | | Atleast 40% 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 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 ‘A’ or above |
| Comprehensive Exam | | UG/PLO/D/CE | | Atleast 40% of the students shall obtain grade ‘A’ (>=75-100%) | |
| 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 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%) |
| 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 of technological change | | 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 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

|  |  |
| --- | --- |
| Intended Learning Outcomes | |
|  | 1. The student will apply knowledge of mathematics, sciences and engineering to solve complex problems using concepts of Mechatronics Engineering 2. 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 3. 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 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. 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 |

5.12.5 **Programme Operational Outcomes**

| **Operational 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**

## 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:** √ **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 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **MASTER’s Level Programs** | | | | |  |  |  |
| *Name of the programme* | | | | |  |  |  |
|  | Learning Outcome 1 | √ | √ |  |  |  |  |
|  | Learning Outcome 2 | √ | √ |  |  |  |  |
|  | Learning Outcome 3 | √ | √ |  |  |  |  |
|  | Learning Outcome 4 | √ | √ |  |  |  |  |
|  | Learning Outcome 5 | √ | √ |  |  |  |  |
|  | Learning Outcome 6 |  |  | √ |  |  |  |
|  | Learning Outcome 7 |  |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  |  | √ |  |  |
|  | 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 using concepts of Mechatronics 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%) |
| 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 Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | 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 marks 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 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 | 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 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 research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions | | 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 | 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 | |
| 5 | | Modern Tool Usage | | The student will create, select and apply appropriate techniques, resources and modern engineering and tools, necessary for computing practice as per the Industrial trends with an understanding of the limitations | | 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 marks 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 contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice | | 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 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 demonstrate the knowledge if and need for the sustainable development | | 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 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 |
| 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 marks 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 plagiarism 15% or below |
| Comprehensive Exam | | UG/PLO/D/CE Framework | | Atleast 40% 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 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 ‘A’ or above |
| Comprehensive Exam | | UG/PLO/D/CE | | Atleast 40% of the students shall obtain grade ‘A’ (>=75-100%) | |
| 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 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%) |
| 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 of technological change | | 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 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**

|  |  |
| --- | --- |
| **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

|  |  |
| --- | --- |
| Intended Learning 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 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, 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 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**

| **Operational 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**

## 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:** √ **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 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **MASTER’s Level Programs** | | | | |  |  |  |
| *Name of the programme* | | | | |  |  |  |
|  | Learning Outcome 1 | √ | √ |  |  |  |  |
|  | Learning Outcome 2 | √ | √ |  |  |  |  |
|  | Learning Outcome 3 | √ | √ |  |  |  |  |
|  | Learning Outcome 4 | √ | √ |  |  |  |  |
|  | Learning Outcome 5 | √ | √ |  |  |  |  |
|  | Learning Outcome 6 |  |  | √ |  |  |  |
|  | Learning Outcome 7 |  |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  |  | √ |  |
|  | 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 using concepts of thermal and fluid sciences | 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 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 problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | 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 marks 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 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 | 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 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 research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions | | 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 | 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 | |
| 5 | | Modern Tool Usage | | 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 of the limitations | | 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 marks 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 contextual knowledge to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to the professional engineering practice | | 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 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 demonstrate the knowledge if and need for the sustainable development | | 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 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 |
| 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 marks 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 plagiarism 15% or below |
| Comprehensive Exam | | UG/PLO/D/CE Framework | | Atleast 40% 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 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 ‘A’ or above |
| Comprehensive Exam | | UG/PLO/D/CE | | Atleast 40% of the students shall obtain grade ‘A’ (>=75-100%) | |
| 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 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%) |
| 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 of technological change | | 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 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)**

|  |  |
| --- | --- |
| 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. 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**

| **Operational 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:** √ **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)  Intended  Student  Learning Outcomes  (SLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO  5 | PEO  6 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **MASTER’s Level Programs** | | | | |  |  |  |
| *Name of the programme* | | | | |  |  |  |
|  | Learning Outcome 1 | √ | √ |  |  |  |  |
|  | Learning Outcome 2 | √ | √ |  |  |  |  |
|  | Learning Outcome 3 | √ | √ |  |  |  |  |
|  | Learning Outcome 4 | √ | √ |  |  |  |  |
|  | Learning Outcome 5 | √ | √ |  |  |  |  |
|  | Learning Outcome 6 |  |  | √ |  |  |  |
|  | Learning Outcome 7 |  |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  |  | √ |  |
|  | Learning Outcome 12 |  |  |  |  | √ | √ |

**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%) |
| 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 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%) |
| 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 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 |
| 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 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 | | | PLO8 | | | Dissertation Rubrics | | | | | 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 15% or below |
| Comprehensive Examination | | | | | UG/PLO/D/CE | | | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) |
| 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 obtain a grade ‘A’ or above |
| 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 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** | |
|  | 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 | |

**5.15.3 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 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. |

**5.15.5Programme Operational Outcomes**

| **Operational 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:** √ **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)  Intended  Student  Learning Outcomes  (SLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO  5 | PEO  6 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **MASTER’s Level Programs** | | | | |  |  |  |
| *Name of the programme* | | | | |  |  |  |
|  | Learning Outcome 1 | √ | √ |  |  |  |  |
|  | Learning Outcome 2 | √ | √ |  |  |  |  |
|  | Learning Outcome 3 | √ | √ |  |  |  |  |
|  | Learning Outcome 4 | √ | √ |  |  |  |  |
|  | Learning Outcome 5 | √ | √ |  |  |  |  |
|  | Learning Outcome 6 |  |  | √ |  |  |  |
|  | Learning Outcome 7 |  |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  |  | √ |  |
|  | Learning Outcome 12 |  |  |  |  | √ | √ |

**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%) |
| 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 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%) |
| 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 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 |
| 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 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 | | | PLO8 | | | Dissertation Rubrics | | | | | 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 15% or below |
| Comprehensive Examination | | | | | UG/PLO/D/CE | | | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) |
| 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 obtain a grade ‘A’ or above |
| 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 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 |

### 5.16 Master’s-Level Programme –

### 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**

| **Operational 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:** √ **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)  Intended  Student  Learning Outcomes  (SLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO  5 | PEO  6 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **MASTER’s Level Programs** | | | | |  |  |  |
| *Name of the programme* | | | | |  |  |  |
|  | Learning Outcome 1 | √ | √ |  |  |  |  |
|  | Learning Outcome 2 | √ | √ |  |  |  |  |
|  | Learning Outcome 3 | √ | √ |  |  |  |  |
|  | Learning Outcome 4 | √ | √ |  |  |  |  |
|  | Learning Outcome 5 | √ | √ |  |  |  |  |
|  | Learning Outcome 6 |  |  | √ |  |  |  |
|  | Learning Outcome 7 |  |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  |  | √ |  |
|  | Learning Outcome 12 |  |  |  |  | √ | √ |

**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%) |
| 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 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%) |
| 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 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 |
| 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 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 | | | PLO8 | | | Dissertation Rubrics | | | | | 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 15% or below |
| Comprehensive Examination | | | | | UG/PLO/D/CE | | | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) |
| 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 obtain a grade ‘A’ or above |
| 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 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**

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| --- |
| **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. |

* + 1. **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. |

* + 1. **Programme Learning Outcomes**

|  |  |
| --- | --- |
| **Learning Outcomes** | |
|  | The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Electrical & Electronics Engineering. |
|  | 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 |
|  | The student will create solutions for electrical & electronics 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.. |
|  | 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. |
|  | 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. |
|  | 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. |
|  | 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. |
|  | 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 goal in multidisciplinary settings. |
|  | The student will use effective communication to cater to both technical and non-technical audiences. |
|  | 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. |
|  | 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. |

**5.17.5 Programme Operational Outcomes**

| **Operational 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. |

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

| Broad-Based  Student Learning  Goals (PEOs)  Intended  Student  Learning Outcomes  (SLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO 5 |
| --- | --- | --- | --- | --- | --- | --- |
| **bachelor’s Level Programs** | | | | |  |  |
| *Name of the programme* | | | | |  |  |
|  | Learning Outcome 1 | √ |  |  |  |  |
|  | Learning Outcome 2 | √ |  |  |  |  |
|  | Learning Outcome 3 | √ |  |  |  |  |
|  | Learning Outcome 4 | √ |  |  |  |  |
|  | Learning Outcome 5 | √ |  |  |  |  |
|  | Learning Outcome 6 |  | √ |  |  |  |
|  | Learning Outcome 7 |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  | √ |  |
|  | Learning Outcome 12 |  |  |  |  | √ |

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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 using concepts of Electrical & Electronics 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%) |
| 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 & electronics engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | 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 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 |
| 3 | Design/Development of Solutions | The student will create solutions for electrical & electronics 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. | 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 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 research-based knowledge and research methods 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%) | 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 ‘A’ or above |
| Major Project Rubric | UG/PLO/D/P2 | 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 | 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 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 & Society | 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 | 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 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 |
| 7 | Environment & Sustainability | The student will recognize the impact of the professional engineering solutions in global, economic, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development | 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 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 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 ‘A’ or above |
| Comprehensive Exam | UG/PLO/D/CE | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) |
| 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 & 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 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 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 |
| 12 | Lifelong Learning | The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change | 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 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 |

**5.18 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” |

## **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. |

* + 1. **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. |

* + 1. **Programme Learning Outcomes**

|  |  |
| --- | --- |
| **Learning Outcomes** | |
|  | The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Electronics & Instrumentation Engineering. |
|  | The student will identify, formulate research literature and analyze Electronics & Instrumentation engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences |
|  | 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 considerations.. |
|  | 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. |
|  | 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. |
|  | 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. |
|  | 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. |
|  | 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 goal in multidisciplinary settings. |
|  | The student will use effective communication to cater to both technical and non-technical audiences. |
|  | 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. |
|  | 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. |

* + 1. **Programme Operational Outcomes**

| **Operational 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. |

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

| Broad-Based  Student Learning  Goals (PEOs)  Intended  Student  Learning Outcomes  (SLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO 5 |
| --- | --- | --- | --- | --- | --- | --- |
| **bachelor’s Level Programs** | | | | |  |  |
| *Name of the programme* | | | | |  |  |
|  | Learning Outcome 1 | √ |  |  |  |  |
|  | Learning Outcome 2 | √ |  |  |  |  |
|  | Learning Outcome 3 | √ |  |  |  |  |
|  | Learning Outcome 4 | √ |  |  |  |  |
|  | Learning Outcome 5 | √ |  |  |  |  |
|  | Learning Outcome 6 |  | √ |  |  |  |
|  | Learning Outcome 7 |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  | √ |  |  |
|  | 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 using concepts of Electronics & Instrumentation 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%) |
| 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 & Instrumentation Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | 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 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 |
| 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 considerations. | 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 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 research-based knowledge and research methods 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%) | 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 ‘A’ or above |
| Major Project Rubric | UG/PLO/D/P2 | 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 the Industrial trends with an understanding of the limitations. | 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 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 & Society | 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 | 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 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 |
| 7 | Environment & Sustainability | The student will recognize the impact of the professional engineering solutions in global, economic, societal and environmental contexts and demonstrate the knowledge if and need for the sustainable development | 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 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 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 ‘A’ or above |
| Comprehensive Exam | UG/PLO/D/CE | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) |
| 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 & 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 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 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 |
| 12 | Lifelong Learning | The student will recognise the need for, and will engage in independent and life-long learning in the broadest context of technological change | 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 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 |

**5.19 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)**

|  |
| --- |
| **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 |

* + 1. **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. |

**5.19.4 Programme Learning Outcomes**

|  |  |
| --- | --- |
| **Programme Learning Outcomes** | |
|  | The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Power Systems Engineering. |
|  | 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 |
|  | The student will create solutions for Power 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.. |
|  | 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. |
|  | 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. |
|  | 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. |
|  | 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. |
|  | 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 goal in multidisciplinary settings. |
|  | The student will use effective communication to cater to both technical and non-technical audiences. |
|  | 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. |
|  | 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**

| **Operational 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. |

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

| Broad-Based  Student Learning  Goals (PEOs)  Intended  Student  Learning Outcomes  (SLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO  5 | PEO  6 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Master’s Level Programs** | | | | |  |  |  |
| *Name of the programme* | | | | |  |  |  |
|  | Learning Outcome 1 | √ | √ |  |  |  |  |
|  | Learning Outcome 2 | √ | √ |  |  |  |  |
|  | Learning Outcome 3 | √ | √ |  |  |  |  |
|  | Learning Outcome 4 | √ | √ |  |  |  |  |
|  | Learning Outcome 5 | √ | √ |  |  |  |  |
|  | Learning Outcome 6 |  |  | √ |  |  |  |
|  | Learning Outcome 7 |  |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  |  | √ |  |
|  | Learning Outcome 12 |  |  |  |  |  | √ |

* + 1. **Student Learning Assessment for M.Tech Power Systems**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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 using concepts of Power System 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%) |
| 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 engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | 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 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 |
| 3 | Design/Development of Solutions | The student will create solutions for Power 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 | 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 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 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 | 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%) |
| 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 |
| 5 | Modern Tool Usage | The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to different power system engineering activities as per the Industrial trends with an understanding of the limitations. | 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 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 |
| 6 | The Engineer & Society | 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 | 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 Rubric | UG/PLO/D/DN | 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 |
| 7 | Environment & Sustainability | 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 | 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 Rubric | UG/PLO/D/DN | 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 | 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 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 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 ‘A’ or above |
| Comprehensive Exam | UG/PLO/D/CE | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) |
| 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 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 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 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 technological change | 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 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 |

### 5.20

### Master of Technology in Control Systems

## **5.20.1Mission 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 |

* + 1. **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**

|  |  |
| --- | --- |
| **Programme Learning Outcomes** | |
|  | The student will apply knowledge of mathematics, sciences and engineering to solve problems using concepts of Control Systems Engineering. |
|  | 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 |
|  | 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.. |
|  | 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. |
|  | 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. |
|  | 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. |
|  | 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. |
|  | 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 goal in multidisciplinary settings. |
|  | The student will use effective communication to cater to both technical and non-technical audiences. |
|  | 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. |
|  | 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**

| **Operational 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. |

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

| Broad-Based  Student Learning  Goals (PEOs)  Intended  Student  Learning Outcomes  (SLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO  5 | PEO  6 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **MASTER’s Level Programs** | | | | |  |  |  |
| *Name of the programme* | | | | |  |  |  |
|  | Learning Outcome 1 | √ | √ |  |  |  |  |
|  | Learning Outcome 2 | √ | √ |  |  |  |  |
|  | Learning Outcome 3 | √ | √ |  |  |  |  |
|  | Learning Outcome 4 | √ | √ |  |  |  |  |
|  | Learning Outcome 5 | √ | √ |  |  |  |  |
|  | Learning Outcome 6 |  |  | √ |  |  |  |
|  | Learning Outcome 7 |  |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  |  | √ |  |  |
|  | 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 using concepts of Control system 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%) |
| 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 engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | 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 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 |
| 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 | 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 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 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4 | | Problem Analysis | 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 | 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%) |
| 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 |
| 5 | | Modern Tool Usage | The student will create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to different control system engineering activities as per the Industrial trends with an understanding of the limitations. | 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 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 |
| 6 | | The Engineer & Society | 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 | 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 Rubric | UG/PLO/D/DN | 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 |
| 7 | Environment & Sustainability | | 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 | 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 Rubric | UG/PLO/D/DN | 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 | 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 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 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 ‘A’ or above |
| Comprehensive Exam | UG/PLO/D/CE | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) |
| 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 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 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 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 technological change | 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 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 |

**5.21 Bachelor’s Level Programmes**

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

## **5.21.1 Mission Statement**

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| **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**

| **Operational 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 summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (**Note:** √ **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 | √ |  |  |  |  |
|  | Learning Outcome 5 | √ |  |  |  |  |
|  | Learning Outcome 6 |  | √ |  |  |  |
|  | Learning Outcome 7 |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  | √ |  |
|  | 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 using concepts of computer 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%) |
| 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 science & engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | 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 | Atleast 40% of the students shall obtain a grade ‘A’ or above |
| 3 | Design/Development of Solutions | 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 | 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 | 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 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 | | 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 ‘A’ or above |
| Comprehensive Examination | | UG/PLO/D/CE | | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) | |
| 5 | | Modern Tool Usage | | 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. | | 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 | Atleast 40% of the students shall obtain a grade ‘A’ or above |
| 6 | | The Engineer & Society | | 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 | | 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  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 demonstrate the knowledge if and need for the sustainable development | | 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  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 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 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% 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 undertake a common goal in multidisciplinary settings | | 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 obtain a grade ‘A’ or above |
| Comprehensive Exam | | UG/PLO/D/CE | | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) | |
| 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 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 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 | | 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 technological change | | 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 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 |
| 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**

| **Operational 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 summaries of these outcomes. These relationships are summarized in the outcomes-to-goals mapping below (**Note:** √ **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 | √ |  |  |  |  |
|  | Learning Outcome 5 | √ |  |  |  |  |
|  | Learning Outcome 6 |  | √ |  |  |  |
|  | Learning Outcome 7 |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  | √ |  |
|  | Learning Outcome 12 |  |  |  |  | √ |

**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 using concepts of computer 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%) |
| 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 science & engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | 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 | Atleast 40% of the students shall obtain a grade ‘A’ or above |
| 3 | Design/Development of Solutions | 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 | 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 | 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 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 | | | 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 ‘A’ or above | |
| Comprehensive Examination | | | UG/PLO/D/CE | | | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) | | |
| 5 | | | Modern Tool Usage | | | 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. | | | 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 | | Atleast 40% of the students shall obtain a grade ‘A’ or above | |
| 6 | | | The Engineer & Society | | | 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 | | | 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  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 demonstrate the knowledge if and need for the sustainable development | | | 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  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 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 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% 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 undertake a common goal in multidisciplinary settings | | | 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 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 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 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 | | | 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 technological change | | | 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 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 | |
| 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 | |

5.23 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)

|  |  |
| --- | --- |
| 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. |

**5.23.3 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**

|  |
| --- |
| **Operational Outcomes** |
| 1. The faculty will use appropriate methodology and pedagogical tools for teaching, learning and development. |
| 1. The curriculum will be contemporary and relevant to meet industry requirements and benchmarked on global standards by incorporating feedback from all the stakeholders. |
| 1. The student will graduate in timely manner. |
| 1. The student and faculty shall have academic facilities, technological resources for teaching and learning. |
| 1. The student will earn achievements in inter-university Extra Curricular activities. |
| 1. 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. |
| 1. The faculty and students will integrate ethics and values in teaching and Learning, in theory and practice. |
| 1. The faculty will facilitate cultivation of cross cultural humanitarian values. |
| 1. The faculty will facilitate joint research collaborations, invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure.. |
| 1. 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. |
| 1. The faculty shall develop and maintain strong relationship with corporate and maintain lifelong alumni network and keep the curriculum responsive to industry needs. |
| 1. 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:** √ **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)  Intended  Student  Learning Outcomes  (SLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO 5 |
| --- | --- | --- | --- | --- | --- | --- |
| **bachelor’s Level Programs** | | | | |  |  |
| *Name of the programme* | | | | |  |  |
|  | Learning Outcome 1 | √ |  |  |  |  |
|  | Learning Outcome 2 | √ |  |  |  |  |
|  | Learning Outcome 3 | √ |  |  |  |  |
|  | Learning Outcome 4 | √ |  |  |  |  |
|  | Learning Outcome 5 | √ |  |  |  |  |
|  | Learning Outcome 6 |  | √ |  |  |  |
|  | Learning Outcome 7 |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  | √ |  |
|  | 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, engineering fundamentals, and domain knowledge in Electronics and Communication Engineering to the solution of complex engineering 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%) | |
| 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 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. | | 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 | 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 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. | | 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 | Atleast 40% of the students shall obtain a grade ‘A’ or above | |
| 4 | Problem Analysis | | The student will demonstrate the research-based knowledge and research methods including design and conduct of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. | | 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%) |
| 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 | |
| 5 | Modern Tool Usage | | The student will create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. | | 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 | | | 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, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. | | 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  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 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. | 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  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 demonstrate ethical principles and commit to 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 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% 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 be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. | 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 obtain a grade ‘A’ or above |
| Comprehensive Exam | UG/PLO/D/CE | Atleast 20% of the students shall obtain grade ‘A’ (>=75-100%) |
| 10 | Communication | The student will be able to communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | 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 feedback | 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 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 | 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 feedback | UG/PLO/ID/II | 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 engage in independent and life-long learning in the broadest context of technological changes and contemporary issues. | 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 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 Learning 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 |

5.24.5 **Programme Operational Outcomes**

| **Operational 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. |

**5.24.6 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:** √ **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 (PEOs)  Intended  Program  Learning Outcomes  (PLOs) | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO 5 |
| --- | --- | --- | --- | --- | --- | --- |
| **Bachelor’s Level Programs** | | | | |  |  |
| *Name of the programme: B.Tech* | | | | |  |  |
|  | Learning Outcome 1 | √ |  |  |  |  |
|  | Learning Outcome 2 | √ |  |  |  |  |
|  | Learning Outcome 3 | √ |  |  |  |  |
|  | Learning Outcome 4 | √ |  |  |  |  |
|  | Learning Outcome 5 | √ |  |  |  |  |
|  | Learning Outcome 6 |  | √ |  |  |  |
|  | Learning Outcome 7 |  | √ |  |  |  |
|  | Learning Outcome 8 |  |  | √ |  |  |
|  | Learning Outcome 9 |  |  |  | √ |  |
|  | Learning Outcome 10 |  |  |  | √ |  |
|  | Learning Outcome 11 |  |  |  | √ |  |
|  | 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 | | 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 grade ‘A’ or above | | Industry Internship | | UG/PLO/ID/ II | | 40% of the students shall obtain a 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%)  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 | 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 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%) | |

**Section VI**

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

# 6.1 Operational Assessment

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| --- | --- | --- | --- | --- |
| **#** | **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. | * FET will encourage faculty to use appropriate methodology and pedagogical tools for teaching, learning and development of students. * The students of FET will graduate in timely manner. | * Student feedback of course faculty. * Faculty qualification and experience files. * Graduation rate in convocation report. * on completion of Registration period (N)   during extended period (N+1+1 for PG and N+2+1 for UG) | * All faculty shall have a minimum criteria of greater than 70% overall score in student feedback. * All faculty to be either M.Tech/PhD or shall have industry experience. * At least 80% students shall graduate on completion of Registration period (N) * 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 | * Functional and area specific club, Committees, Sports Events, co-curricular and extracurricular activities and student’s participation in inter institutional competition. * List of Award winners | * Every student shall be a part of at least one Club or Committee or inter institutional competition. * . |
| 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. | Faculty data about Research work and other Scholar activities such as:   * Scholarship of teaching; published and unpublished articles, manuscripts, books, curriculum review and evaluation of teaching material. * Scholarship of Discovery: published articles, manuscripts, papers presented, dissertations/ thesis, * Scholarship of Integration: published articles, manuscripts, papers presented, dissertations/ thesis, conference and workshops attended. * Scholarship of application: published articles, manuscripts, papers presented, consultations, policy analysis, programme evaluation. * Professional activities: Routine consulting, conference, workshop, professional meeting attendance, professional membership. |  |
| 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*.* | * Attrition Rate * Courses embedded in curriculum such as Behavioral Science Courses, Human Values and Community Outreach, etc. * Plagiarism check. * Feedback system. | * Attrition rate shall be below 10% annually * Faculty Feedback shall be taken for each course. * 80% faculty shall have 4 or 5 on 5 point Likert Scale. |
| 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. | * List of community/ social sector projects/ activities/ engagements. * Organizing Cultural programmes. * Day of Belongingness. * Celebration of festivals for culturally diverse group of students. | * 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. | * Study Abroad Programme * Exchange Programs for students. * Conferences/ Seminars organized by national and international speakers and delegates. * Collaborative Research. | * 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 * FET will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies | * Ranking in national and international ranking agencies. * Accreditation at institutions and programme levels. | * Continuous review and enhancement of all the required systems and processes to upgrade/ maintain high standards |
| 8 | FET will build a strong industry interaction by way of alumni networks and empanelment of expertise from industry. | * 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. |  |  |
| 9 | FET will facilitate employment opportunities and also support students to start their own ventures. |  |  |
| 10 | FET will facilitate good governance in discharge of responsibilities and execution of policies and programs. | * FET will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies. |  |  |

**6.2 Operational Outcomes**

|  |  |
| --- | --- |
|  | **Intended Operational Outcomes** |
|  | FET will encourage faculty to use appropriate methodology and pedagogical tools for teaching, learning and development of students. |
|  | The curriculum is contemporary, developed in collaborative consultation with all the stakeholders, benchmarked with global standards and relevant to the industry requirements. |
|  | The students of FET will graduate in timely manner. |
|  | FET shall maintain appropriate academic facilities and technological Resources for teaching and learning. |
|  | The students of FET will participate in Co Curricular and Extra Curricular activities. |
|  | Faculty will be engaged in scholarly and professional activities in order to enhance their competencies and to contribute to the existing Body of Knowledge. |
|  | The FET will integrate ethics and values in teaching, theory and practice, develop and retain excellent students, faculty and staff. |
|  | FET will facilitate joint research collaborations; invite international delegates and speakers for seminars and conferences and various other opportunities for global exposure. |
|  | FET will be continuously engaged in developing/ reviewing processes, policies and systems to achieve prestigious accreditations from various national, international bodies and ranking bodies. |
|  | 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. |

# 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**

