Centre for Engineering Education and Research (CEER)
Distinct Practice

Objectives:

CEER as a centre proved for its distinctiveness, includes the following objectives :

- To drive the faculty towards research and provide the platform for the improvement of Engineering Education.
- Assisting one another to collaborate for empowerment of the knowledge and skills in Engineering Education
- Need to identify and train the competent student & faculty to handle the service based and problem-solving aspects
- Provides the facilities/resources to train the student & faculty in multidisciplinary aspects, critical and design thinking aspects for effective and smooth functioning of the course work
- To provide academic and technical training to neighboring Government schools
- Identify the genuine NGO partners for continuous interaction and support in promoting service/project-based learning
- Interact with officials of nearby villages/communities to educate and develop the field & community projects which enhance the students' self-learning skills, problem-solving techniques, interdisciplinary, team building and management skills.

Context:

In India, around 15% of the 10,00,000 graduates are with sufficient employability skills. Though graduates are technically sound, they face challenges in Social consciousness, Community engagement, Problem Solving, team-building management skills, resulting in technocrats with complete social disconnectivity. After brainstorming with various stakeholders of institution, the following are the issues to be addressed in order to meet the challenges:

1. Social awareness & social responsibility.
2. Contribution & Coordination skills.
3. Self-initiative & self-learning skills.

The Practice:

To achieve the above-mentioned objectives, CEER was established in 2017, with 15 faculty members from various engineering disciplines. It adapted several new and innovative practices, majorly divided into four broad sections as:

1. Introducing of new engineering courses
2. Engineering Projects in Community Services Program
3. Strengthening Naipunya club activities
4. Enhancing Teaching-Learning Practices

- **Introducing new Engineering Courses:** To enhance students' problem-solving skills, community engagement, and team building management skills, the centre introduced two new freshmen engineering courses, in order to develop and implement new ideas to meet social needs and create social relationships & collaborations with various communities.
- **Engineering Projects In Community Service(EPICS)**: With the motto of service based learning, EPICS was introduced in 2014. It is taken under the umbrella of CEER from 2018 considering the concepts of social responsibility & community engagement.
  - **Strengthening Naipunya Club activities:** This is to spread the knowledge across the rural community and government schools. It offers training to unemployed people of nearby villages to improve their skill set to improve employability opportunities, Assisting neighboring Government school teachers and students.
- **Enhancing Teaching Learning Practices:** CEER has extended its collaborations with national and international bodies for upgrading faculty skillset. CEER faculty are encouraged to publish papers on non-engineering zoners like Engineering Education, and community studies etc..

Process of execution:

1. Introducing Freshman Engineering Courses:

   Three courses were introduced in B. Tech. curriculum to adapt effective & active learning methodologies for content delivery..

   Part 1 : Engineering Exploration & Practice (I Year). The interdisciplinary students' teams will be given a need based statement to implement a product, which covers most of the basics of engineering disciplines.

   Part 2:

   a. **Introduction to Social Innovation- ISI (**I Year),Interdiscipline students' teams are exposed to several communities to identify, analyze and a solution should be suggested.

   b. **Social Innovation in Practice** (II Year). The feasible solution, which is finalized during the ISI course, will be designed and implement a prototype.

   Part 3: Project work/EPICS

   Mini Project : For III Year.

   Major Project : For IV Year. .

2. **Engineering Projects In Community Service (EPICS)**

   The implemented prototype (as part of Social Innovation in Practice), will be validated by the stakeholders and then a real time module will be implemented.

3. **Strengthening Naipunya Club Activities:**

   It is a community-oriented club, to

   - Conduct skill development programs to the unemployed youth.
   - Impart practical knowledge and exposure about advanced technologies to the government school students.

- Assisting neighboring Government school teachers and students in the execution of ATAL Tinkering labs.

4. **Teaching Learning Practices (TLP):**

TLP promotes the value and practice of excellent teaching methodologies. It provides diverse opportunities for both faculty and students. This includes.

- International certification courses –IUCEE-IIEECP
- Encourage faculty to participate and conduct International Conferences, webinars and workshops.

IUCEE-International Certification Courses:

Being an IUCEE consortium member faculties encouraged towards attaining online International certification courses, enhancement of teaching learning pedagogies & engineering education research:

- IUCEE International Engineering Educators Program (IIEECP)
- Design Thinking Course
- Outcome Based Engineering (OBE)
- IUCEE Ethics Course

IUCEE International Engineering Educators Certification Courses.(IIEECP)

This is to educate the participants on revising the classroom policies and practices to enhance student learning.It is scheduled in three phases - Phase-I(Pre-certification), Phase-II(Online Modules) & Phase-III(Capstone Presentation).

Design Thinking Course

This is to generate ideas for complex problems with a human centered approach. Faculty could guide the students to implement a human centered way of approach to the curriculum projects.

Outcome Based Engineering (OBE): The course prepares teachers and management of Institutions to deliver world-class education and achieve high quality of learning outcomes by their students with modern concepts, tools and methodologies. The course covers fundamentals to advance level concepts and theories with plenty of practical examples and best practices as well as guidance on implementation. The course aims to make an ordinary teacher to an outstanding teacher.

Ethics Course: Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity. This course educates the participants on Personal Ethics, Professional Ethics, Ethics for Environment and Sustainability.

Evidence Of Success:

- Freshman Engineering Courses:

    - 163 prototypes were implemented successfully as part of the course work of Engineering Exploration & Practice,
- EPICS program implementation:
    - 33 Projects are deployed into the nearby community which addressed the issues/problems faced.
    - MoUs, MoAs with NGOs, Colleges and Industries
- Naipunya Club:
    - Received 10 appreciation letters from Government school and Sarpanches.
    - Few community people were employed as Welders, Turners and Electricians in the industries nearby.
- Teaching Learning Methodologies:
    - 5 Faculty have attended workshops on Engineering Education.

Problems Encountered and Resources Required:

The following are the challenges:

- Students expressed the provision of more community visits in order to have thorough communication with community partners.
- Due to pandemic we could not conduct events adequately and effectevely
- Faculty require more training and workshops, from the rural education department to acquire better knowledge about social research.

Head - CEER **PRINCIPAL**