KARUNYA INSTITUTE OF TECHNOLOGY AND SCIENCES
(Declared as Deemed to be University under Sec. 3 of the UGC Act 1956)
A CHRISTIAN MINORITY RESIDENTIAL INSTITUTION
AICTE Approved & NAAC Accredited
Karunya Nagar, Coimbatore - 641 114, Tamil Nadu, India

DEPARTMENT OF MECHANICAL ENGINEERING

Biomass and Solar Energy Laboratory

The purpose of this laboratory is to familiarize students with thermo-chemical conversion and bio-chemical conversion methods of biomass. The lab facilities available are pyrolysis reactor, anaerobic digester, biomass gasifier, gas chromatography, multi fuel engine test rig, solar flat plate collector, dish type solar concentrating collector, wind mill and solar photo voltaic cell. In this laboratory, the biomass waste is converted into useful energy. Liquid fuel and gaseous fuel are obtained from biomass. Thermal and electric power can be generated from biomass waste. Solar photo voltaic cell is used for water pumping application. Solar concentrating collector and solar flat plate collector are used for hot water applications.

Course Objectives:

To impart knowledge on

- The thermochemical conversion method of biomass
- The anaerobic digestion process of biomass waste
- The construction and working principle of solar collectors

Course Outcomes:

At the end of the course, the student will be able to

- Evaluate the yield of bio-oil from biomass waste
- Analyze the composition of bio gas
- Design a lab scale pyrolysis reactor
- Understand the concept of PV cell for water pumping application
- Analyze the performance of solar flat plate collector
- Apply the concept of solar concentrating collector for power application

Facilities available for regular class work, project, research and consultancy

- ✓ Pyrolysis Reactor
- ✓ Biomass Gasifier
- ✓ Anaerobic Digester
- ✓ Biogas Plant
- ✓ Multifuel Engine Test Rig
- ✓ Exhaust Gas Analyzer
- ✓ Biogas Flow Meter
- ✓ Gas Chromatography
- ✓ Solar Flat Plate Collector
- ✓ Solar Concentrating Collector
- ✓ Wind Mill
- ✓ Solar Photo Voltaic Cell

Major Equipment's:

Fig. 1 Fixed Bed Pyrolysis Reactor

Fig. 2 Biomass Gasifier

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Fig. 3 Biogas Plant

Fig. 4 Gas Chromatography

Fig. 5 Fluidized Bed Pyrolysis Reactor

Fig. 6 Solar PV System

Fig. 7 Solar Flat Plate Collector

. **Fig. 8 Parabolic Dish Type Solar Collector**

Fig. 9 Wind Mill

List of Experiments:

1. Bio oil production from non-edible oil cake using pyrolysis reactor.
2. Wood gas production using biomass gasifier.
3. Biogas production from animal waste using biogas plant.
4. Performance of solar photo voltaic cell for water pumping application.
5. Performance of solar flat plate collector for water heating application.
6. Performance of solar concentrating collector.

Associated Faculty Member: Dr. S. Antony Raja M.E., Ph.D.,

Lab Technician: Mr. C. John Kennedy