

21AENG252 RENEWABLE ENERGY AND GREEN TECHNOLOGY

Hours Per Week :

L	T	P	C
1	-	2	2

Total Hours :

L	T	P
15	-	30

COURSE DESCRIPTION AND OBJECTIVES:

This course introduces various renewable energy sources such as biogas plants, solar photovoltaic system, gasifier, briquetting and production of bio-fuels and makes them familiar in using renewable energy gadgets such as solar light, solar pumping, solar fencing, solar cooker, solar drying system, solar distillation and solar pond

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Understand the status and requirement of conversion of renewable source of energy and the principle of construction and working of the renewable source of energy
2	Analyses the application of renewable source of energy in farming sector
3	Acquire knowledge of fuel cells, wave power, tidal power and geothermal principles and applications

SKILLS:

- ✓ Apply the concepts of renewable energy source for agricultural sectors
- ✓ Evaluate the options and estimate the energy generation through renewable sources
- ✓ Design and development of gasifiers



Source :

<https://www.downtoearth.org.in/blog/energy/renewable-energy-is-the-way-forward-57455>

ACTIVITIES:

- o Familiarization with renewable energy gadgets
- o Draw design for biogas plant
- o Prepare plan for solar fencing
- o Demonstrate functioning of different solar systems

UNIT - 1

Introduction: Renewable energy sources, classification, advantages and disadvantages. Biomass - Importance of biomass, classification of energy production – Principles of combustion, pyrolysis and gasification. Biogas - Principles of biogas production, advantages, disadvantages, utilization. Biogas plants - Classification, types of biogas plants, constructional details of biogas plants

UNIT - 2

Gasfires: Types of gasifiers - Producer gas and its utilization. Briquettes, briquetting machinery – Types and uses of briquettes - Shredders.

Solar energy: Solar energy, application of solar energy, methods of heat transfer, conduction, convection and radiation

UNIT - 3

Solar appliances: Flat plate collectors, focusing type collectors, solar air heater. Solar space heating and cooling - Solar energy gadgets, solar cookers, solar water heating systems. Solar grain dryers, solar refrigeration system, solar ponds

UNIT - 4

Solar photovoltaic system: Solar lantern, solar streetlights, solar fencing, solar water pumping system.

Wind energy: Advantages, disadvantages, wind mills and types. Constructional details of wind mills, applications of wind mills

UNIT - 5

Biofuels: Characteristics of various biofuels, different parameters and calorific values. Bio diesel production – Applications, extraction from jatropha. Ethanol from Agricultural produce (sugarcane and corn)

LABORATORY EXPERIMENTS**LIST OF EXPERIMENTS**

1. Availability and uses of non - conventional energy in agricultural sector
2. Bio-fuel production from biomass and its application
3. Practical approach to biogas production and biogas plants capacity and design calculations
4. Running gasifiers and production details of producer gas
5. Production details of briquettes from briquetting machine
6. Experimenting with solar gadgets like solar-cooler and solar water heater for their performance -I
7. Experimenting with solar gadgets like solar-cooler and solar water heater for their performance -II

8. Performance of solar photovoltaic system and observing various factors influencing efficiency of the photo-voltaic system
9. Evaluation of solar pump for agriculture
10. Study of solar drying system, solar distillation and solar pond
11. Steps adopted for erecting solar fence
12. Visit to solar wind farm - I
13. Visit to solar wind farm - II
14. Visit to solar photovoltaic farm - I
15. Visit to solar photovoltaic farm – II

REFERENCES:

1. Rajput, R. K. 2012. Non-conventional Energy Sources. S. Chand Publishers
2. Rathore, N.S., Mathur, A.N. and Kothari, S. Alternate Sources of Energy. ICAR Publication
3. Rai, G.D. 2004. Non-conventional Energy Sources. Khanna Publishers, New Delhi. Pvt. Ltd
4. Ojha, T.P. and Michael, A.M. Principles of Agricultural Engineering. Vol. I, Jain Brothers, New Delhi
5. Chakravarty, A. and Amalendu Chakraverty. 1989 Biotechnology and Other Alternative Technologies for Utilization of Biomass-Agricultural Wastes. 1st edition, Oxford and IBH Publishers, New Delhi

