ST. JOSEPH’S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

III SEMESTER **AGRICULTUREANDRURAL DEVELOPMENT** Time:3hrs/week

AENG 252(2) **RENEWABLE ENERGY AND GREEN TECHNOLOGY** Marks:60

w.e.f AJ 2022-2023  **SYLLABUS**

**Objectives**

* To know Availability and uses of non - conventional energy in agricultural sector.
* To know Bio-fuel production from biomass and its application.
* To study about Practical approach to biogas production and biogas plants capacity and design calculations.
* To study about Evaluation of solar pump for agriculture

**Course Outcomes**

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

**CO1:** Explain the classification, advantages and disadvantages of renewable energy sources.

**CO2:** Classify gasifiers and briquettes and explain the uses.

**CO3:** Outline the methods of tapping solar energy and its applications.

**CO4:** Summarize the types, construction and applications of wind mills.

**CO5:** Discuss the characteristics of biofuels and production of biodiesel and ethanol from biomass.

**Theory**

**UNIT -I (3 Hours)**

1. Introduction - Renewable energy sources, classification, advantages and disadvantages.

2. Biomass - Importance of biomass, classification of energy production - Principles of combustion, pyrolysis and gasification.

3. Biogas - Principles of biogas production, advantages, disadvantages, utilization.

4. Biogas plants - Classification, types of biogas plants, constructional details of biogas plants.

**UNIT-II (3 Hours)**

1. Types of gasifiers - Producer gas and its utilization.

2. Briquettes, briquetting machinery – Types and uses of briquettes - Shredders.

3. Solar energy – Application of solar energy, methods of heat transfer, conduction, convection and radiation.

**UNIT-III (3 hours)**

1. Solar appliances - Flat plate collectors, focusing type collectors, solar air heater.

2. Solar space heating and cooling - Solar energy gadgets, solar cookers, solar water heating systems.

3. Solar grain dryers, solar refrigeration system, solar ponds.

**UNIT -IV (3 Hours)**

1. Solar photovoltaic system - Solar lantern, solar street lights, solar fencing, solar water pumping system.

2. Wind energy - Advantages, disadvantages, wind mills and types.

3. Constructional details of wind mills, applications of wind mills.

**UNIT-V (3 hours)**

1. Biofuels – Characteristics of various biofuels, different parameters and calorific values.

2. Bio diesel production – Applications, extraction from jatropha.

3. Ethanol from agricultural produce (sugarcane and corn).

**References text books**

1. Rai, G.D. 2004. Non-conventional Energy Sources. Khanna Publishers, New Delhi.
2. Rajput, R. K. 2012. Non-conventional Energy Sources. S. Chand Publishers.
3. Ojha, T.P. and Michael, A.M. Principles of Agricultural Engineering. Vol. I, Jain Brothers, New Delhi.
4. Rathore, N.S., Mathur, A.N. and Kothari, S. Alternate Sources of Energy. ICAR Publication.

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