22REE301 RENEWABLE POWER SOURCES

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Hours Per Week :

L	T	P	C
1	2	2	3

PREREQUISITE KNOWLEDGE: Basics of renewable energy.

COURSE DESCRIPTION AND OBJECTIVES:

The goal of this course is to familiarize the students with the relevance of renewable power sources and their application. To impart knowledge about the production of bio-energy, solar energy, wind energy and hydra power, their construction, principle of working, application and maintenance.

MODULE-1

UNIT-1 **4L+8T+0P=12 Hours**

RENEWABLE ENERGY:

Energy consumption pattern & energy resources in India. Renewable energy options, potential and utilization. Biogas technology and mechanisms, generation of power from biogas.

UNIT-2 **4L+8T+8P=20 Hours**

BIOGAS PLANT :

Power generation from urban, municipal and industrial waste. Design & use of different commercial sized biogas plant. Solar thermal and photovoltaic.

PRACTICES:

- Performance evaluation of solar water heater.
- Performance evaluation of solar cooker.
- Characteristics of solar photovoltaic panel.
- Evaluation of solar air heater/dryer.

MODULE-2

UNIT-1 **4L+8T+8P=20 Hours**

POWER GENERATION:

Systems for power generation. Central receiver (Chimney) and distributed type solar power plant, OTEC, MHD, hydrogen and fuel cell technology. Wind farms.

UNIT-2 **4L+8T+8P=20 Hours**

AERO-GENERATORS:

Aero-generators. Wind power generation system. Power generation from biomass (gasification & Dendro thermal), Mini and micro small hydel plants. Fuel cells and its associated parameters.

PRACTICES:

- Performance evaluation of biomass gasifier engine system (throatless & downdraft).
- Performance evaluation of a fixed dome type biogas plant.
- Performance evaluation of floating drum type biogas plant.
- Estimation of calorific value of biogas & producer gas.
- Testing of diesel engine operation using dual fuel and gas alone.

SKILLS:

- ✓ *Apply the concepts of renewable energy sources for agricultural sectors .*
- ✓ *Evaluate the options and estimate the energy generation through renewable sources.*

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Understand perceiving status and requirement of conversion of renewable source of energy.	Apply	1	1, 2, 7
2	Understand the principle of construction and working of renewable source of energy.	Apply	1	1, 2, 3 , 4, 6, 9
3	Apply and development of renewable energy production units.	Apply	2	1, 2, 6, 7, 9
4	Evaluate and differentiate the renewable and non-renewable source of energy.	Create	2	1, 2, 3, 4, 6, 7, 9, 11

TEXT BOOKS:

1. Garg H.P. “Advances in Solar Energy Technology” D. Publishing Company, Tokyo, 1998.
2. Alan L: Farredbruch & R.H. Buse. 1983. Fundamentals of Solar Academic Press, London.

REFERENCE BOOKS:

1. Bansal N.K., Kleemann M. & Meliss Michael. “Renewable Energy Sources & Conversion Technology” Tata Mecgrow Publishing Company, New Delhi, 1999.
2. Rathore N. S., Kurchania A. K. & N.L. Panwar. “Non Conventional Energy Sources” Himanshu Publications, 2007.