# 7.1.2 The Institution facilities for Alternate sources of energy and energy conservation measures

Regulation R20

Branch: Civil Engineering

Course code:01

Subject: Renewable Energy Sources

Year/Semester :III-I

Syllabus



# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA KAKINADA-533003, Andhra Pradesh, India

# DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

III Year -I SEMESTER	I.	T	E-	C
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RENEWABLE EN	ERGY SOURCES			
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### Preamble:

This course presents the various sources of renewable energy such as solar, wind, geothermal energy, biomass & other potential energy and contribution towards energy profile of the nation.

## Course Objectives:

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  To study the solar radiation data, equivalent circuit of PV cell and its I-V & P-V characteristics.

  To understand the concept of Wind Energy Conversion & its applications.

  To study the principles of biomass and geothermal energy.

  To understand the principles of Ocean Thermal Energy Conversion (OTEC), motion of waves and power associated with it.

  To study the various chemical energy sources such as fuell cell and hydrogen energy along with their operation and genivolant circuit.
- their operation and equivalent circuit

Solar Energy: Introduction - Renewable Sources - prospects, Solar radiation at the Earth Surface - Equivalent circuit of a Photovoltaic (PV) Cell - I-V & P-V Characteristics - Solar Energy Collectors; Flat plate Collectors, concentrating collectors - Solar Energy storage systems and Applications: Solar Pond - Solar water heating - Solar Green house.

Wind Energy: Introduction - basic Principles of Wind Energy Conversion, the nature of Wind - the power in the wind - Wind Energy Conversion - Site selection considerations - basic components of Wind Energy Conversion Systems (WECS) - Classification - Applications.

## UNIT-III

UNIT-III

Biomass and Geothermal Energy:

Biomass: Introduction - Biomass conversion technologies - Photosynthesis, factors affecting Bio digestion - classification of biogas plants - Types of biogas plants - selection of site for a biogas plant Geothermal Energy: Introduction, Geothermal Sources - Applications - operational and Environmental problems.

Energy From oceans, Waves & Tides: Oceans: Introduction - Ocean Thermal Electric Conversion (OTEC) - methods - prospects of OTEC in

Waves: Introduction - Energy and Power from the waves - Wave Energy conversion devices.

Tides: Basic principle of Tide Energy - Components of Tidal Energy.

## Chemical Energy Sources:

Fuel Cells: Introduction - Fuel Cell Equivalent Circuit - operation of Fuel cell - types of Fuel Cells -Applications.

Hydrogen Energy: Introduction - Methods of Hydrogen production - Storage and Applications

Magneto Hydro Dynamic (MHD) Power generation: Principle of Operation - Types.

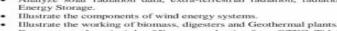
R-20 Syllabus for EEE-JNTUK w.e.f. 2020 -21



## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA KAKINADA-533003, Andhra Pradesh, India DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

After the completion of the course the student should be able to:

Analyze solar radiation data, extra-terrestrial radiation, radiation on earth's surfa-



- Demonstrate the principle of Energy production from OTEC, Tidal and Waves. Evaluate the concept and working of Fuel cells & MHD power generation.

# Text Books:

- G.D.Rai, Non-Conventional Energy Sources, Khanna Publications, 2011.
   John Twidell & Tony Weir, Renewable Energy Sources, Taylor & Francis, 2013.