

Subject: Non-Conventional Energy Sources (OE -7)								
Program: B. Tech. (Mechanical)				Subject Code: ME0520			Semester: V	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE) Theory	Continuous Internal Evaluation (CIE) Practical	Total Marks
2	0	2	3	16/40	16/40	24/60	24/60	200

Course objectives

1. To understand various forms of Non-Conventional Energy sources
2. To make students aware of present energy scenario & need for energy conservation
3. To know about utilization of renewable energy sources for domestic & industrial purposes.
4. To analyze environmental aspects of Non-Conventional Energy sources.

Course Outcomes

1. To understand ways of energy production by various unconventional energy sources
2. Recognize the need and ability to engage in lifelong learning for further developments in this field.
3. Students will be able to identify new methodologies/ technologies for effective utilization of Non-Conventional Energy Sources.

COURSE CONTENT

UNIT-1

[08]

1. Solar Energy

Extra-Terrestrial Radiation: Spectral distribution of extra-terrestrial radiation, solar constant, solar radiation at the earth's surface, beam, diffuse and global radiation, instruments for measuring solar radiation and sun shine, solar radiation data.

2. Solar Collectors

Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors, Transmission losses in the Cover, Testing of Solar Collectors.

UNIT-2

[04]

3. Wind Energy

Working Principle, Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria, Wind Measurements

UNIT-3

[04]

4. Biomass Energy

Origin of Biomass, Physical Methods of Bioconversion, Liquefaction of Biomass, Biological Methods for Biomass Conversion, Production of Ethanol, application of bio-gas, application of bio-gas in engines, advantages

UNIT-4

[08]

5. Tidal & Ocean Thermal Energy

Mechanism of Tides and waves as energy suppliers, fundamental characteristics of tidal power, harnessing tidal energy, limitations. Ocean Thermal Energy Conversion-Principle of working, Rankine cycle, OTEC power stations in the world, problems associated with OTEC, mini-hydel power plants, and their economics.

Text Books

1. "Non-Conventional Energy Sources", Rai G.D., Khanna Publishers, New Delhi, 1st edition,
2. "Non-Conventional Energy Sources", N K Bansal, Vikas Publishing House, New Delhi,
3. "Renewable energy sources and conversion technology", M. Kleemann, Tata McGraw Hill,

Reference Books

1. Solar Energy: Principles of Thermal Collection & Storage, S P Sukhatme, Tata McGraw Hill, New Delhi, 2nd edition, 2010.
2. Energy Technology: Non Conventional Renewable and Conventional, S Rao, B Parulekar, Khanna Publishers, New Delhi, 3rd edition, 1994.
3. Wind Energy Conversion Systems, Freris. L.L, Prentice Hall, UK, 1st edition, 1990 .
4. Non-Conventional Energy, Ashok V Desai, New Age International, New Delhi, 1st edition,
5. Introduction to Biofuels, David M Mousdale, Prentice Hall, UK, 1st edition, 1990.

Web resources

1. <https://lecturenotes.in/subject/57/non-conventional-energy-systems-nces>
2. <https://swayam.gov.in/courses/4894-july-2018-non-conventional-energy-resources>.
3. https://onlinecourses.nptel.ac.in/noc18_ge09.

MOOCS

1. Solar Energy Engineering and Technology, Swayam
2. Wind Resources for Renewable eenergies

<https://www.mooc-list.com/course/wind-resources-renewable->

3. Renewable Energy and Green Building Entrepreneurship,
4. Elements of Renewable Energy

LIST OF EXPERIMENTS:

1. Study of solar Energy
2. Study of solar radiation measuring instruments
3. Study of modern solar distillation or solar still.
4. Study of solar water pumping
5. Study the constructional various types solar cooker
6. Study about solar power generation and lighting
7. Study solar drying and solar pond system
8. Study of Wind energy
9. Study Thermochemical and Biochemical route of biomass energy conversion
10. Study of Tidal energy and Ocean thermal energy