



Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Physics and Electronics

**UG Semester I**

**Course Code: GE I**

**Course Title: Energy Sources-I**

**Course Code: 101PHY1401**

**Hours/Week: 03**

**Marks: 60**

**Credits: 03**

**Lectures: 45 Hrs.**

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**Learning Objectives:**

- LO 1. To facilitate the students to achieve a clear conceptual understanding of technical and commercial aspects of Sources of Energy.
- LO 2. Identify renewable and nonrenewable energy sources.
- LO 3. Analyze the use and effectiveness of renewable source of energy.

**Course Outcomes:**

After completion of course the student will be able to-

- CO 1. Describe sources and uses of energy.
- CO 2. Differentiate between renewable and non-renewable sources of energy.
- CO 3. Differentiate between conventional and non-conventional sources of energy
- CO 4. Provide examples of common types of renewable and non-renewable resources.
- CO 5. Explain general ways to save energy at a personal, community and global level.

Unit No.	Title of Unit & Contents	Hrs.
<b>I</b>	<b>Renewable Energy Sources</b>	<b>12</b>
	1. Introduction to Renewable Energy Sources, 2. Energy Concept-Sources in General, Its Significance & Necessity, 3. Classification of Energy Sources: Primary and Secondary Energy, Commercial and Non-Commercial Energy, 4. Renewable and Nonrenewable Energy, Conventional and Non-Conventional Energy. 5. Importance of Non-Commercial Energy Resources. 6. Renewable Energy Sources: Need of Renewable Energy, Nonconventional Energy Sources, an Overview of	

Unit No.	Title of Unit & Contents	Hrs.
	<p>Developments in Offshore Wind Energy,            7. Tidal Energy, Wave Energy Systems, Ocean Thermal Energy Conversion,            8. Solar Energy, Biomass, Biochemical Conversion, Biogas Generation, Geothermal Energy Tidal Energy, Hydroelectricity.</p> <p><b>Unit Outcomes:</b></p> <p>UO 1. Identify renewable energy supplies reduce the emission of greenhouse gases significantly if replaced with fossil fuels.</p> <p>UO 2. Recognize renewable energy supplies are obtained naturally from ongoing flows of energy in our surroundings.</p>	
<b>II</b>	<b>Conventional Energy Sources</b>	<b>11</b>
	<p>1. Conventional Energy Sources: Fossil Fuels &amp; Nuclear Energy production &amp; Extraction,            2. Usage Rate and Limitations,            3. Impact on Environment and Their Issues &amp; Challenges,            4. Overview of Indian &amp; World Energy Scenario with Latest Statistics- Consumption &amp; Necessity,            5. Need of Eco-Friendly &amp; Green Energy &amp; Their Related Technology</p> <p><b>Unit Outcome:</b></p> <p>UO 1. Recognize the use of conventional sources like firewood, fossil fuels etc. for heating, lighting, cooking, running machinery and for provision of electricity</p>	
<b>III</b>	<b>Solar Energy</b>	<b>11</b>
	<p>1. Solar Energy: Solar Energy-Key Features, Its Importance,            2. Merits &amp; Demerits of Solar Energy, Applications of Solar Energy,            3. Solar Water Heater, Flat Plate Collector, Solar Distillation,            4. Solar Cooker, Solar Green Houses, Solar Cell -Brief Discussion of Each,            5. Need and Characteristics of Photovoltaic (PV) Systems, PV Models and Equivalent Circuits, and Sun Tracking Systems.</p> <p><b>Unit Outcomes:</b></p> <p>UO 1. Outline the technologies that are used to harness the power of solar Energy.</p> <p>UO 2. Explain the principles that underlie the ability of various natural phenomena to deliver solar energy.</p>	

Unit No.	Title of Unit & Contents	Hrs.
<b>IV</b>	<b>Wind Energy</b>	<b>11</b>
	1. Fundamentals of Wind Energy, 2. Wind Turbines and Different Electrical Machines in Wind Turbines, 3. Power Electronic Interfaces, and Grid Interconnection Topologies, 4. Ocean Energy Potential against Wind and Solar, 5. Wave Characteristics and Statistics, Wave Energy Devices, 6. Tide Characteristics and Statistics, Tide Energy Technologies 7. Ocean Thermal Energy.	
	<b>Unit Outcomes:</b> UO 1. Employ Wind turbines to make electricity. UO 2. Predict tidal power uses the moment of water to push a turbine to generate electricity.	

#### **Learning Resources:**

1. Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi
2. Solar energy - M P Agarwal - S Chand and Co. Ltd.
3. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.
4. Renewable Energy, Power for a sustainable futur, Godfrey Boyle, 2004, Oxford University Press, in association with The Open University.
5. Solar Energy: Resource Assessment, Dr. P Jayakumar, Handbook, 2009
6. Photovoltaics, J. Balfour, M. Shaw and S. Jarosek, Lawrence J Goodrich (USA).
7. Biomass Regenerable Energy, D D Hall and R P Grover Wiley; 1st edition (May 18, 1987).
8. Introduction to Renewable Energy Technology: A Year Long Science and Technology Course, United States Department of Energy
9. Introduction to Renewable Energy (Energy and the Environment), Vaughn Nelson, CreateSpace Independent Publishing Platform (February 3, 2015).
10. Renewable Energy Integration (Green Energy and Technology), Jahangir Hossain and Apel Mahmud, Springer; 2014th edition (February 14, 2014).



## Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Physics

**Course Type: GE1 Lab Course**

**Course Title: Energy Sources**

**Course Code: 101PHY1402**

**Credits: 01**

**Max. Marks: 40**

**Hours: 15**

### Learning Objectives

LO 1. Learning by doing' is the experimental work,

LO 2. To expose Students to the techniques of handling Equipments for renewable energy sources.

### Course outcomes

After completion of course the student will be able to-

CO 1. Determine I-V Characteristics of Solar cell.

CO 2. Determine Characteristics of Solar Collector and Solar cooker.

CO 3. Demonstrate effect of Dust Accumulation on PV Panel,

Practical No.	Unit
1	To study I-V Characteristics of Solar cell. .
2	To study Solar cell.
3	To determine Solar constant.
4	To study Characteristics of Solar cooker.
5	To study the effect of Dust Accumulation on PV Panel.
6	To study Characteristics of Solar Collector.

N.B.: At least four experiments should be performed from above.