

## Course Based on Environment and Sustainability

KASC B. Sc Physics 2018 – 2019 Batch Only  
For (V and VI Semesters Only)

Sem.	Course Code	ELECTIVE COURSE I (B) - Renewable Energy Sources	Total Marks: 100		Hours Per Week	Credits
V	17UAOET506			CIA: 25	ESE: 75	4

### OBJECTIVES

- To create awareness towards the Renewable Energy Sources
- To understand the Operation, Feasibility and Viability of various Renewable Energy Resources

### COURSE OUTCOMES:

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

- CO1: Recall the requirement of alternative energy sources
- CO2: Understand the implementation of solar energy systems
- CO3: Exposed to the basics of wind energy extraction
- CO4: Analyse the various resources of biomass energy and their conversion systems
- CO5: Evaluate the hybrid storage systems

### UNIT I:

**Energy Scenario:** Introduction – Energy Resources Utility – Renewable Resources – Non-Renewable Resources – Measurement of Energy – New Technologies in Energy Resources – Environmental Impacts of Alternative Energy Sources – Environmental Issues – Global Warming – Proper utilization and the difficulties in Renewable Energy Resources.

### UNIT II:

**Solar Thermal Systems:** Solar Radiation at the Earth Surface – Electricity from Solar Energy – Solar Constants – Diffuse Solar Radiation – Solar Radiation Measurements – Solar Radiation Data

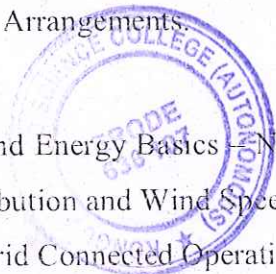
**Types of Collectors:** Conversion of Solar Radiation into Heat – Flat Plate Collectors – Concentrating Collectors

**Photo Voltaic Technology:** Evolution of Photovoltaic cell – Power Generation – Applications of Solar Photovoltaic Systems

**Solar Cell:** Solar Cell Principle – Solar Cell Configuration – Conversion Efficiency and Power Output – Solar Cell Arrangements.

### UNIT III:

**Wind Energy:** Wind Energy Basics – Nature of the Wind – Wind Power – Power extracted from Wind – Wind distribution and Wind Speed Prediction – Wind Power Systems – Types of Turbine Stand-Alone and Grid Connected Operation – Environmental Aspects.



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**UNIT IV:**

**Biomass:** Various Resources – Energy Content – Status of Biomass Energy - Advancements – Conversion of Biomass into Solid, Liquid and Gaseous forms.

**Wave Energy:** Energy and Power from Waves – Wave Energy Conversion Devices – Geothermal Energy – Ocean Thermal Electric Conversion Systems – Advantages and Disadvantages

**UNIT V:**

**Energy Storage and Hybrid System:** Battery Types – Battery Design – Flywheel Energy Relations – Flywheel Design and Components – Fuel Cell Energy – Storage Systems – Ultra Capacitors

**Text Book:**

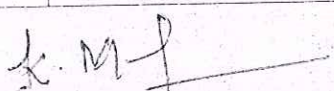
S. Sindhuja and P. Sivakumar – Renewable Energy Sources – First Edition 2011: Reprint 2013 – Anuradha Publications, Chennai

**Reference Books:**


1. Solar Energy Utilization – G. D. Rai - 5<sup>th</sup> Edition, Latest Reprint 2016 - Khanna Publications, Delhi
2. Solar Energy – C. G. Agarwal - S. Chand & Co, NewDelhi.
3. Biophysics - Dr. S. Thiravia Raj - Saras Publications - Nagerkoil

**QUESTION PAPER PATTERN**

SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit

  
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