



# **SATHYABAMA**

**INSTITUTE OF SCIENCE AND TECHNOLOGY  
(DEEMED TO BE UNIVERSITY)**

**Accredited "A" Grade by NAAC | 12B Status by UGC | Approved by AICTE  
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## **Department of Electrical and Electronics**

**New course introduced**

<b>SL. NO.</b>	<b>COURSE CODE</b>	<b>COURSE OFFERED</b>
1	SEEA3027	Green Energy Systems

SEEA3027	<b>Green Energy Systems</b>	L	T	P	Credits	Total Marks
		3	0	0	3	100

### COURSE OBJECTIVES

To understand the need and advantages of renewable energy.

To study the performance, efficiency and the relevancy to the future energy needs.

#### UNIT 1 INTRODUCTION

9 Hrs.

Overview of conventional & renewable energy sources, need, potential & development of renewable energy sources, types of renewable energy systems, Future of Energy Use, Present Indian and international energy scenario of conventional and RE sources, Energy for sustainable development, Environmental Aspects of Energy, Limitations of RE sources.

#### UNIT 2 SOLAR ENERGY

9 Hrs

Theory of solar cells - VI and PV curves - Equivalent circuit. Concept of solar PV module, Panel, Array, Maximum Power Point tracking - Solar PV systems - Solar Collectors Classifications— Solar PV Applications- Solar Refrigeration - Solar Pond Power Plant - Solar Thermal Power Plant.

#### UNIT 3 WIND ENERGY

9 Hrs.

Wind Power and its Sources-Energy from Wind - Horizontal axis Wind Turbine - Vertical Axis Wind Turbine - Wind Energy Conversion Systems - Cp Vs Speed Curve.

#### UNIT 4 HYDROGEN PRODUCTION AND HYDROGEN STORAGE

9 Hrs.

Chemical Production of Hydrogen- Electrolytic Hydrogen- Thermolytic Hydrogen- Photolytic Hydrogen- Photobiologic Hydrogen Production- Compressed Gas- Cryogenic Hydrogen- Storage of Hydrogen - Adsorption- Chemical Compounds- Hydride Hydrogen Compressors- Hydride Heat Pumps.

#### UNIT 5 HYBRID RENEWABLE ENERGY SYSTEMS

9 Hrs.

Need for Hybrid Systems- Range and type of Hybrid systems - Configuration and Coordination, Electrical interface: wind-PV, Wind-PV-Fuel cell.

**Max. 45 Hours**

### COURSE OUTCOMES

- CO1 - Gain knowledge on the various classification of energy sources and their environmental issues
- CO2 - Analyse the limitless availability of green energy sources
- CO3 - Acquire the knowledge of the principles of solar energy conversion and their benefits
- CO4 - Enable for building a small range of wind energy conversion system
- CO5 - learn hydrogen production method and storage methods
- CO6 - understand the challenges in renewable hybrid system

### TEXT / REFERENCE BOOKS

1. Aldo Vieira da Rosa , Juan Carlos Ordonez, "Fundamentals of Renewable Energy Processes" -Elsevier academic press 4th Edition 2021
2. Janaka Ekanayake and Nicholas Jenkins "Renewable Energy Engineering"- Cambridge university press-2017
3. B Khan , "Non conventional Energy resources", Tata McGrawHill, 2 nd Edition 2009.
4. Mukund R. Patel ,Wind & Solar Power Systems- Design, Analysis and Operation, , Taylor and Francis, 2nd Edition 2005.
5. James Larminie & Andrew Dicks, "Fuel Cell Systems Explained", John Wiely & Sons, 2nd Edition.
6. John Twideu and Tony Weir, "Renewal Energy Resources" BSP Publications, 2006.
7. C.S. Solanki, "Renewal Energy Technologies: A Practical Guide for Beginners" PHI Learning.

### END SEMESTER EXAMINATION QUESTION PAPER PATTERN

**Max. Marks:100**

**Exam Duration:3 Hrs.**

**PART A:** 10 Question of 2 marks each – No choice

**20 Marks**

**PART B:** 2 Questions from each unit of internal choice; each carrying 16 marks

**80 Marks**