PARVATHANENI BRAHMAYYA
SIDDHARTHA COLLEGE OF ARTS & SCIENCE
Autonomous
Siddhartha Nagar, Vijayawada–520010
Re-accredited at 'A+' by the NAAC

SEMESTER IV (22PH4M1)

RENEWABLE ENERGY ENGINEERING: SOLAR, WIND AND BIOMASS ENERGY SYSTEMS

Offered to : M.Sc.(PHYSICS)	Course Code : 22PH4M1
Course Type : MOOCs	Course :Renewable Energy Engineering: Solar, Wind And Biomass Energy Systems
Year of Introduction : 2022	Year of offering : 2022
Year of Revision : 2022	Percentage of Revision : Nil
Semester : IV	Credits : 3
Hours Taught : 60 hrs. per Semester	Max.Time : 3 Hours

Course Description:
This course help the students to acquire knowledge on basic concepts of renewable energy,

Course objectives:

1. To understand the basics of renewable, biomass energy sources and relevant thermodynamics
2. To learn to deploy new and renewable energy for supplementing the energy requirements
3. To learn to reduce the dependency on fossil fuels
4. To bring awareness about different non conventional energy sources
5. To know the conversion principles and technology behind renewable energy sources

Course outcomes: At the end of the course the student will be able to:

1. Understand the renewable energy sources
2. Understand the operation of different renewable energy sources
3. Able to understand the biomass energy generation and its technologies
4. Develop capability to do basic design of bio gas plant.

5. Understand the applications of different renewable energy sources like ocean thermal, hydro, geothermal energy etc.

CO-POMATRIX								
	CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
22PH4M1	**CO1**		H					
	CO2		H					
	CO3		H					
	CO4						H	
	CO5		H					

Syllabus		
Unit	**Learning Units**	**Lecture Hours**
I	Solar energy: Basics and concepts, Non-concentrating solar collectors: practice problems	12
II	Concentrating solar collectors, storage systems	12
III	Biomass types and characterization, Biochemical conversion processes	12
IV	Bioconversion of substrates into alcohol and thermo-chemical conversion of biomass	12
V	Wind Energy: Basics: Turbine terms, types and theories, Characteristics and Power Generation from Wind Energy	12

ThestudentsshallbeallowedtoregisterandappearforMOOCsofhis/herownchoiceSWAYAM/NPTEL, **which is not covered in the syllabus**, on the recommendation of the faculty. Theavailable/suitable online courses shall be suggested to the students during the third semester and/or at thebeginning of the IV semester, which is mandatory course. The students are to complete the MOOCssuccessfully and submit the pass certificates of the same to the University through the Principal of theCollege concerned for the approval and endorsement of the same on the grade cards and PCs and ODs aspertheregulationsof the University.

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SEMESTER IV (22PH4M1)

RENEWABLE ENERGY ENGINEERING: SOLAR, WIND AND BIOMASS ENERGY SYSTEMS

Offered to: M.Sc.(PHYSICS) Course Code: 22PH4M1
Course Type: MOOCs

Course: Renewable Energy Engineering: Solar, Wind And Biomass Energy Systems

Year of Introduction: 2022 Year of offering: 2022
Year of Revision: 2022 Percentage of Revision: Nil
Semester: IV Credits: 4

Hours Taught: 60 hrs. per Semester Max.Time:3 Hours

Description of the course:

This course emphasizes on the fundamentals of non-conventional energy sources (solar, wind, and biomass) and harnessing the energy through these sources using efficient technologies. These technologies play an important role in serving clean energy for mankind. Thus, processes to harness energy are steadily gaining technical and economic importance worldwide. Therefore, it is necessary for energy planners/ users to know the facts as well as limitations of these technologies. This course aims at bringing the technological developments and research trends in the field of non-conventional energy sources with emphasis on engineering and design aspects. After attending this course students will have insight of biomass types, classifications, selective utilization of biomass resource for extraction of energy, bio-digester, wind machine and thermo-digester design.

Course objectives:

1. To understand the basics of renewable, biomass energy sources and relevant thermodynamics
2. To learn to deploy new and renewable energy for supplementing the energy requirements
3. To learn to reduce the dependency on fossil fuels
4. To bring awareness about different non conventional energy sources
5. To know the conversion principles and technology behind renewable energy sources

Course outcomes: At the end of the course the student will be able to:

1. Understand the renewable energy sources

2. Understand the operation of different renewable energy sources

3. Able to understand the biomass energy generation and its technologies

4. Develop capability to do basic design of bio gas plant.

5. Understand the applications of different renewable energy sources like ocean thermal, hydro,
geothermal energy etc.

CO-POMATRIX								
	CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
22PH4M1	**CO1**	M						
	CO2	M						
	CO3	M						
	CO4						M	
	CO5	M						

Course content:

Unit – I : Solar energy: Basics and concepts, Non-concentrating solar collectors: practice problems

Unit – II: Concentrating solar collectors, storage systems

Unit – III: Biomass types and characterization, Biochemical conversion processes

Unit – IV: Bioconversion of substrates into alcohol and thermo-chemical conversion of biomass

Unit – V: Wind Energy: Basics: Turbine terms, types and theories, Characteristics and Power Generation from Wind Energy

P.B. Siddhartha College of Arts & Science, Vijayawada - 520 010.
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc., (PHYSICS) Programme - IV Semester

Course Code: 22PH4M1
Title: Renewable Energy Engineering: Solar, Wind And Biomass Energy Systems
w.e.f admitted batch 2022-23)

Time: 3 Hours **Max. Marks: 70**
Answer All Questions **5x4=20M**

1. (a) Discuss the social implications of renewable energy sources? (CO1) BTL2

(or)

(b) Differentiate between renewable and non renewable energy sou

2. (a) Explain about solar collectors. (CO2) BTL2

(or)

(b) Explain the working principle of storage system?

3. (a) Explain different types of biomass.	(CO3)	BTL2
(or)		
(b) Explain two characteristics of biomass.		
4. (a) Discuss different types of substrates.	(CO4)	BTL2
(or)		
(b) Differentiate between thermochemical conversion and bioconversion processes.		
5. (a) Discuss wind energy.	(CO5)	BTL2
(or)		
(b) What is a turbine?		

Answer All Questions **5x10=50 M**

6. (a) Discuss non concentrating solar cell collector.		
(or)		
(b) Discuss the practical problems involved in non concentrating solar cell collector	(CO1)	BTL2
7. (a) Explain concentrating solar cell collector		
(or)		
(b) Explain different storage systems of solar energy.	(CO2)	BTL3
8. (a) Discuss the Briet - Wigner one level formula.		
(or)		
(b) Explain the four factor formula for controlled fission.	(CO3)	BTL3
9. (a) Discuss the thermochemical conversion of biomass.		
(or)		
(b) Discuss the bioconversion of substrates into alcohol.	(CO4)	BTL2
10. (a) Explain the characteristics of wind energy .		
(or)		
(b) Explain the generation of power from wind energy.	(CO5)	BTL2