E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)

(Re-accredited (3rd Cycle) with Grade A+ and CGPA 3.51 by NAAC)

DEPARTMENT OF PHYSICS-UG

CERTIFICATE COURSE

SOLAR ENERGY

COURSE STRUCTURE

(w.e.f.2019-2020 onwards)

Duration: 90 hrs

S.NO	SUB CODE	TITLE OF THE PAPER	EXAM DURATION (Hrs)	MAX MARKS
1.	19PC1	SOLAR ENERGY	3	100
2.	19PCPR	PROJECT	-	100

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CBSC

DEPARTMENT OF PHYSICS

(w.e.f.2019-2020 onwards)

Title of the Paper : Certificate Course in Solar Energy

Semester : III & IV **Contact hours : 90**

Subject Code : 19PC1

Objectives

To expose students with

- To make awareness on types of energy
- To introduce the knowledge of Renewable energy
- To Create the knowledge on Solar energy

UNIT I: - Fundamentals of Energy science and Technology

Introduction-Energy sectors-Classification of energy resources- Advantages and disadvantages of conventional Energy sources -Importance of Non-conventional Energy sources -Energy scenario in India-Annual per capita energy consumption- Sector-wise energy consumption-Electrical power generation-Availability of primary energy resources-Growth of energy sector and its planning in India.

UNIT II:-Energy conservation

Introduction-Various Aspects of Energy Conservation –Economic Aspect-Environmental Aspect- Depletion of Non-renewable Energy Assets Principles of Energy Conservation-General Electrical ECOs-Simple Electrical ECOs- Intermediate Electrical ECOs-Comprehensive Electrical ECOs.

UNIT III:-Solar energy basics

Structure of the Sun- The solar constant –The electromagnetic Energy Spectrum-Solar Radiation outside the Earth's Atmospheres (Extra Terrestrial radiation)-Solar Radiation at the Earth's Surface (Terrestrial radiation)-Some Terms and Basic earth Sun Angles-Determination of Solar Time.

UNIT IV: - Solar thermal systems

Introduction-Solar Collectors-Flat Plate Collector-Compound Parabolic Concentrator-Cylindrical Parabolic Concentrator-Solar Cookers-Box Type Solar Cooker-Paraboloidal Dish Type - Solar Distillation –Solar Air Heater-Industrial Application of Solar Energy (up to textile industry).

UNIT V:-Solar photovoltaic systems

Introduction-Solar Cell Fundamentals-Semiconductors - A PN junction-Solar Cell, Module, Panel and Array Construction-Solar PV Systems-Central Power Station System –Distributed System-Solar PV Application-Grid Interactive PV Power Generation-Water Pumping-Lighting-Medical Refrigeration-Village Power-Telecommunication and Signaling.

Text books:

1. Khan B.H, *Non-conventional energy Resources*, Tata McGraw Hill Education Private Limited, New Delhi, 2012. [Unit –I, II, IV, V]

2. G.D. Rai, Solar Energy Utilisation, Khanna Publishers, New Delhi. Fifth Edition, 1995. [Unit- III, IV]

Unit - I	**Chapter**	**1.1, 1.2, 1.4, 1.6, 1.9, 1.14**
Unit - II	**Chapter**	**2.1, 2.3, 2.4, 2.5**
Unit - III	**Chapter**	**3.1-3.7**
Unit - IV	**Chapter**	**5.1, 5.2, 5.2.1, 5.2.3, 5.2.4, 5.7, 16.3, 16.4**
Unit - V	**Chapter**	**6.1, 6.2, 6.2.1, 6.2.2, 6.4, 6.5, 6.9, 6.10**

Reference Books:

1. Chetan singh solanki , *Renewable Energy Technologies* ,PHI Learning Private Limited, Second Edition, New Delhi, 2011.

2. Kothari D.P, Singal K.C, Rakeshranjan, *Renewable Energy Source and Emerging Technologies*, PHI learning private limited, New Delhi, Second Edition, 2011.

3. John Twidell & Tony Weir, *Renewable Energy Resource* Taylor & Francis, New Delhi Second Edition, 2013.

4. Rai G.D, *Non-Conventional Energy Sources*, Khanna Publishers, New Delhi, Fourth Edition, 2008.

5. Tiwari G.N, *Solar Energy Fundamentals, Design Modeling And Application*, Narosa Publishing House, New Delhi, First Edition, 2002.

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CBCS

DEPARTMENT OF PHYSICS

(w.e.f. 2019-2020 onwards)

Title of the paper: Certificate course in solar energy

Semester : III & IV

Subject Code : 19PCPR

Objectives:

The course aims at providing a comprehensive understanding of principles pertinent to practical applications in the field of solar energy physics.

Project work:

1. Students are provided opportunities to carry out the projects on the following topics.
    - Study of efficiency of solar box cooker
    - Study of efficiency of solar drier.
    - Study of efficiency of solar PV cells.
    - Performance study of solar distillation unit.
    - Efficiency study of solar PV lighting system.
    - Solar Air Heater.
    - Solar water Heater.
    - Solar cooker.
    - Effects of amount and wavelength of light on a solar cell.
2. The project report should be submitted to the department.
3. The viva-voce exam based on the report will be conducted at the time of Examination.