Course Code	Course Name	Credits
26PH110	SOLAR THERMAL AND PHOTOVOLTAIC ASPECTS	04

Course Objectives

- To familiarize students with solar energy and different solar powerd items can be used in various application.

Learning Outcomes

Upon successful completion of this course it is intended that a student will be able to:

- Understand various phenomenon of solar system.
- Gain the knowledge of energy extraction from solar power with different instruments.
- Know about Different use of solar energy

Unit 1 - Solar System (12 Hrs.)

Energy from the sun, solar window, atmospheric effects, diffused radiations, Air mass, effect of Air Mass, seasonal effects, environmental effects on standard test conditions.

Unit 2 – Basics Of Solar Thermal Energy (13 Hrs.)

Sun movement over the day, shadowing effects, Photovoltaic Cell. Advantages& disadvantages of photo-voltaic conversion. Use of solar cell in various instruments. Photo-voltaic array& its connections, arrangements of array according to the voltage. Module& its connections. Faults & their effects in photo-voltaic cell, array & module (connection of cell, connection of array, connection of module.

Unit 3 - Solar Power (12 Hrs.)

Solar Photovoltaic energy conversion and utilization, solar power generation systems, off-grid systems, grid connected systems, power control and management systems, economics of solar photovoltaic systems, World Energy Requirement, Energy and Role of Photovoltaic, Types of PV Installation, Common Systems type, GRID-TIED System, Hybrid Systems, Photovoltaic in Energy Supply.

Unit 4 – Solar Energy (11 Hrs.)

Solar energy generation, solar radiation, radiation measuring instruments, radiation measurement and predictions, atmospheric effects, seasonal effects, environmental effects on standard test conditions, Solar PV production and cost.

Unit 5 - Solar Photovoltaic System (12 Hrs.)

Check the functions of different parts upto the performance level expected. Balance of Solar PV Systems: Electrical Storage: Battery technology, Batteries for Photovoltaic systems, DC – DC converters, Charge Controllers, DC – AC inverters; single phase, three phase, MPPT.

Reference Books:

1. Solar Photovoltaic; Chetansinghsolanki; PHI, Learning private ltd., New dehli- 2018
2. Non-conventional Sources of Energy , G.D Rai, Khanna Publishers, Delhi, 2012
3. Solar Power Hand Book, Dr. H. Naganagouda (2014)
4. Renewable Energy Technologies; A Practical Guide for Beginners, Chetan Singh Solanki, PHI School Books (2008)
5. Renewable Energy Sources and Emerging Technologies, Kothari D.P. and Signal K.C New Arrivals –PHI; 2 Edition (2011)

Websites and eLearning Sources:

1. https://nptel.ac.in/courses/113104084
2. https://youtu.be/9y7ri0mKrSQ?si=1Fk_39VytP9zmFwj
3. https://youtu.be/Xm13Kq_E1ik?si=Sjhk5u2_WgSeBKWq

COs and Bloom's Taxonomy Mapping – 26PH110		
Course Outcomes	**On successful completion of this course, students will be able to**	**BTL**
CO1	Recall and describe key concepts related to solar energy, including types of photovoltaic systems, solar radiation measurements, and the components of solar power generation systems.	K1
CO2	Explain the principles of solar energy conversion, the function of photovoltaic cells, and the impact of atmospheric conditions on solar power generation.	K2
CO3	Apply mathematical techniques and theoretical concepts to analyze solar power generation systems**,** including calculating energy output and assessing the efficiency of different photovoltaic arrangements.	K3
CO4	Analyze the performance of solar photovoltaic systems, identifying faults and their effects on the system's efficiency and energy output, while also interpreting data from radiation measurement instruments.	K4
CO5	Critically evaluate the economic feasibility of solar photovoltaic systems and design an independent research project or proposal aimed at improving solar energy technologies or addressing challenges in solar energy utilization.	K5, K6

BTL (Bloom's Taxonomy Level) - K1 – Remembering, K2 – Understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6 - Create

Relationship Matrix – 26PH110													
Course Outcomes	**Programme Outcomes (POs)**						**Programme Specific Outcomes (PSOs)**						**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	
CO1	3	2	1	1	1	1	3	1	1	1	1	1	1.42
CO2	3	2	2	1	1	1	3	3	2	1	1	1	1.75
CO3	2	3	3	2	1	2	1	2	3	2	1	2	2.00
CO4	2	3	3	1	1	2	1	2	3	2	2	2	2.00
CO5	2	3	2	2	1	3	1	2	2	3	3	3	2.25
												Total	1.88

Mean Score: 3- High, 2- Medium/Moderate, 1-Low

FULLY HUMAN
Fully
Alive