GUJARAT TECHNOLOGICAL UNIVERSITY
Syllabus for Bachelor of Vocation (B. Voc.), 6th Semester
Branch: Solar & Renewable Energy
Subject Name: Solar Radiation and Thermal Conversion
Subject Code: 1160702

Type of course: Core

Prerequisite: Basic of Solar Radiation and Thermal Applications

Rationale: The course on Solar Radiation and Thermal Conversion is essential for understanding renewable energy, focusing on solar technologies that address climate change. It equips students with practical skills in system design and measurement techniques, fostering innovation and sustainability. By exploring diverse applications and materials, students prepare for careers in the growing solar industry, contributing to a sustainable future.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE(E)	PA(M)	ESE(V)	PA(I)	
3	0	0	3	50	0	0	0	50

Sr. No.	Topic	No. of Hours	Module Weightage
01	**Solar Energy Conversion:** Introduction, Principle of Solar Energy Conversion, Types of Solar Energy Conversion, Result of solar energy conversion	6	**10%**
02	**Geometry of the angles:** Solar radiation, geometry of the Earth-Sun angles – Solar angles. Calculation of angle of incidence - Surface facing due south, horizontal, inclined surface and vertical surface.	10	**25%**
03	**Types of Solar Collectors:** Radiation Measuring Instruments, Need of collector, different types of solar collector: Flat Plate Collector, Evacuated Tube Collector, Focus Collector, Comparison of different types of solar collector, case studies.	10	**25%**
04	**Concentrators:** Optical design of concentrators, Solar water heaters, Heat exchangers, Solar dryers, Solar stills, Solar cooling and refrigeration. Solar Concentrating **Collectors:** Line focusing and Point-focusing concentrators.	8	**20%**
05	**Materials for Solar Thermal Systems:** Material for special coatings, reflectors, lenses, receivers, tracking and non-tracking concentrator, thermal energy storage, heat exchangers.	8	**20%**

Distribution of marks weightage for cognitive level:

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**20**	**20**	**-**	**-**	**-**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze, E: Evaluate C: Create above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Solar Photovoltaic: Fundamentals, Technologies and Application, Chetan Singh Solanki, PHI Learning Pvt., Ltd., 2009.
2. Renewable Energy Source & Emerging Technologies, D P Kothari, K C Singal. PHI Learning Pvt. Ltd.
3. Renewable Energy Technologies; A Practical Guide for Beginners, Chetan Singh Solanki, PHI School Books (2008)

Course Outcome:

Sr. No.	CO statement	Marks %weightage
CO1	Understand the principles and types of solar energy conversion.	20
CO2	Analyze the geometry of solar radiation and calculate angles of incidence.	25
CO3	Compare various solar collector types and their applications.	25
CO4	Explore the design and function of concentrators in solar thermal systems.	20
CO5	Evaluate materials used in solar thermal applications.	20