GUJARAT TECHNOLOGICAL UNIVERSITY

BE – Semester 6
Minor Degree : Solar Energy Systems
Subject Code : N116AJ02(w.e.f. AY 2025-26)
Subject Name : Photovoltaic System Sizing

Prerequisite : Basic Electrical Engineering, Basic Electronics.

Rationale : The Sizing of the solar photovoltaic power plant is one of the important aspect as the selection of the various components such as ACDC, DCDB, inverter and cable can be done based on sizing of the PV plants. The course is aimed to provide the knowledge and skills of the sizing of off-grid, grid tied PV plants for rooftop and ground mounted PV plant and operation maintenance of the ground mounted solar photovoltaic power plant.

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	2	4	70	0	30	0	100

Content :

Unit No.	Course Content	No of Hours
1	Measuring appliance power and energy: Residential, Commercial and industrial application.	**6**
2	Determining energy usage from an electric bill: Residential, Commercial and industrial application.	**8**
3	Adjusting for location and system losses, Load Size, Inverters sizing, and Charge controller sizing.	**6**
4	Site survey, design, and installation of ground-mounted and rooftop solar PV systems, sizing of micro, string, and central inverter for grid-tied photovoltaic system	**14**
6	Operation and maintenance of the ground mounted and roof top solar photovoltaic systems	**08**
	Total Hrs.	**42**

Suggested Specification table (Theory) :

Distribution of Theory Marks (%)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	40	15	20	15	**0**

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

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Reference Books :

1. Deutsche Gesellschaft für Sonnenenergie (DGS). *Planning and installing photovoltaic systems: a guide for installers, architects and engineers*. Routledge, 2013.
2. Solanki, Chetan Singh. *Solar photovoltaics: fundamentals, technologies and applications*. Phi learning pvt. Ltd., 2015.
3. Burdick, Joseph, and Philip Schmidt. *Install your own solar panels: designing and installing a photovoltaic system to power your home*. Storey Publishing, 2017.
4. Stefan, Krauter, and W. Krauter. "Solar electric power generation-photovoltaic energy systems." (2006): 20.

Course Outcomes : Upon completion of this course students should be able to :

Sr. No.	Course Outcomes	Marks % Weightage
01	Apply the knowledge of equipment for the measurement of power consumption.	15 %
02	Analyze electricity usage in residential, commercial, and industrial applications.	20 %
03	Evaluate system losses and will adjust the sizing of the PV system.	15 %
04	Understand the steps of the site survey for the installation of a new solar photovoltaic power plant and sizing of grid-tied PV Inverters.	30 %
05	Apply the fundamentals for the operation and maintenance of solar PV systems.	20 %

List of Practical :

1. Measurement of electrical power consumption of the residential and commercial load.
2. Measurement of electrical power consumption of the industrial load.
3. To be familiar with the tools helpful for operation and maintenance.
4. Workout power flow calculations of stand-alone PV system with DC load and battery.
5. Workout power flow calculations of stand-alone PV system with AC load and battery.
6. Workout power flow calculations of stand-alone PV system with combined DC and AC load with battery.