FACULTY OF ENGINEERING & TECHNOLOGY

First Year Master of Technology

Semester II

Course Code: 102450202

Course Title: SOLAR PHOTOVOLTAIC POWER PLANTS: PLANNING, DESIGN AND BALANCE OF SYSTEMS

Type of Course: Core Course IV

Course Objectives:

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Internal		External		Total
Lecture	Tutorial	Practical		Theory	J/V/P*	Theory	J/V/P*	
3	0	2	4	30/15	20/10	70/35	30/15	150/75

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	INTRODUCTION: Power Plant Scenario - Classification, Basic Principles and Features - Comparison and selection Criteria.	5
2	PHOTOVOLTAIC BASICS: Structure and working of Solar Cells - Types, Electrical properties and Behaviour of Solar Cells – Cell properties and design - PV Cell Interconnection and Module Fabrication - PV Modules and arrays - Basics of Load Estimation.	8
3	STAND ALONE PV SYSTEMS: Schematics, Components, Batteries, Charge Conditioners - Balance of system components for DC and/or AC Applications - Typical applications for lighting, water pumping etc.	9
4	GRID CONNECTED PV SYSTEMS: Schematics, Components, Charge Conditioners, Interface Components - Balance of system Components - PV System in Buildings.	5
5	HYBRID SYSTEMS: Solar, Biomass, Wind, Diesel Hybrid systems - Comparison and selection criteria for a given application.	7
6	DESIGN OF PV SYSTEMS: Radiation and load data - Design of System Components for different PV Applications - Sizing and Reliability - Simple Case Studies.	5

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Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						**R**: Remembering; **U**: Understanding; **A**: Application, **N**: Analyze; **E**: Evaluate; **C**: Create
R	**U**	**A**	**N**	**E**	**C**	
16	20	23	13	14	14	

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 Photovotaics – Fundamentals, Technologies and Applications, CS Solanki, PHI Learning Pvt. Ltd..
2	Solar Cells Operating Principles, Technology, and System Applications Martin A. Green, Prentice- Hall, 2008.
3	The Physics of Solar Cells, Nelson, J. Imperial College.
4	Solar Electricity, Thomas Markvart, John Wiley and Sons.
5	Applied Photovoltaics Stuart R. Wenham, Martin A. Green, Muriel E. Watt, Richard Corkish (Editors), Earthscan.
6	The Solar Electricity Handbook, Michael Boxwell, Code Green Publishing.
7	Solar Power Your Home for Dummies, Rik DeGunther, Wiley Publishing.
8	Photovoltaics: Design and Installation Manual, Published by Solar Energy International.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand the concept of solar photovoltaic systems based power plant.	**23%**
CO-2	To know the basic construction of PV cell.	**17%**
CO-3	Students able to demonstrate the stand alone system and hybrid system.	**34%**
CO-4	Students able to design of various PV-interconnected systems.	**26%**

List of Practicals / Tutorials:

1	Measurement of solar radiation using pyranometer.
2	To study the voltage and current of the solar cell in series combination.
3	To find PV device characterization.
4	To study the PV based hybrid system.
5	Performance on standalone PV system.
6	Study of Solar photovoltaic power plants.
7	Performance of solar photovoltaic power plants.
8	Performance of Solar Pump.
9	Estimate the load calculation of house (Case study).
10	Find out the No of panels required for estimated load.
11	Study of PV-T system.
12	To study Effect of shadow on solar PV panel.

Supplementary learning Material:

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Curriculum Revision:	
Version:	**1**
Drafted on (Month-Year):	Apr-20
Last Reviewed on (Month-Year):	Jul-20
Next Review on (Month-Year):	Apr-22

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