GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Master of Technology	Branch/Spec.	Electrical (Renewable Energy)
Semester	I	Version	1.0.0.0
Effective from Academic Year	2025-2026	Effective for the batch Admitted in	July 2025
Course code	3EE11PE7	Course Name	Solar and Wind Energy System

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50

Pre-requisites:

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Course Outcomes:

On successful completion of the course, the students will be able to:

CO1	Understand the solar resource, solar radiation and its measurements, PV system and recent trends.
CO2	Analysis the PV module, power storage system and its installation process.
CO3	Applying the solar PV plant, solar radiation pattern, designing the solar system through the latest software.
CO4	Evaluate the present and future growth with respect to all aspects of the solar energy technology.

Theory syllabus

Unit	Content	Hrs
1	**Solar Thermal:** Physics of the sun, The solar constant, Extraterrestrial and terrestrial solar radiation, Solar radiation on tilted surface, Instruments for measuring solar radiation and sun shine, Solar radiation data, Flat plate and concentrating collectors, Classification of concentrating collectors, Orientation and thermal analysis, Advanced collectors.	**06**
2	**Solar Photovoltaic:** Photovoltaic energy conversion, Solar cell fundamentals, Solar cell classification, Amorphous, Mono-crystalline, Polycrystalline, Performance of solar cell, V-I characteristics of a PV panel, Maximum Power point Tracking (MPPT) algorithm.	**09**
3	**Wind Energy Basics:** Characteristics of Wind, principles of wind energy conversion, Components of wind energy conversion system, Classification of wind turbines, Horizontal axis and vertical axis, Betz limit ratio, Advantages and disadvantages of wind energy system.	**12**
4	**Wind Turbine Technologies:** Review of modern wind turbine technologies, Fixed and Variable speed wind turbine, Squirrel-cage Induction generator, Wound rotor motor induction generators, Doubly Fed Induction Generator, Synchronous Generators, Permanent Magnet Synchronous Generators and their characteristics.	**11**
5	**Integration of Solar and Wind:** Wind power integration into grid-power system stability, Economics of grid network, Codes and standards for grid integration, Grid connected PV systems, Control scheme used for single stage grid connected PV system, Case study on hybrid system (PV-Wind).	**07**

Practical content

Practical's, assignments and tutorials are based on above syllabus.

Text Books

1.	D.P Kothari, K.C Singal, Rakesh Ranjan., "Renewable Energy Sources and Emerging Technologies", PHI learning Pvt Ltd.
2.	Siraj Ahmed, " Wind Energy Theory and Practice", PHI learning Pvt Ltd.

Reference Books

1.	Chetan Singh Solanki "Solar Photovoltaics: Fundamentals, Technologies and Applications", Prentice Hall India.
2.	Tiwari and Ghosal, "Renewable Energy resources", Narosa.
3.	John Twidell and Tony Weir, " Renewable Energy Resources", Taylor and Francis.

ICT/MOOCS

1.	Solar Energy Engineering and Technology - Course.
2.	NPTEL :: Physics - NOC:Solar Energy Engineering and Technology.
3.	Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems - Course.

Mapping of CO with PO and PSO:															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	1	1	0	0	1	1	1	3	2	2
CO2	3	2	3	1	1	1	0	0	1	1	1	1	3	2	1
CO3	2	3	2	2	2	1	1	0	0	1	1	1	2	2	1
CO4	2	2	2	2	2	1	2	0	1	1	1	1	2	2	1