K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:I
Class:PG-I	Program:M.Tech
Branch Code:ELE	Pattern:2024
Name of Course:Renewable Energy System	Course Code:2406504 (A)
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains _02____page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

		Marks	CO
Question No. 1			
1a)	Explain the I-V characteristics of a solar PV cell and describe how these characteristics are affected by temperature and irradiance.	(6)	CO1
Question No. 2			
2a)	Describe the basic principle of wind energy conversion and list the factors affecting wind power generation.	(6)	CO1
Question No. 3			
3a)	Explain the key design considerations for a hybrid solar PV-wind system.	(8)	CO2
	OR		
3b)	Describe the working of a Maximum Power Point Tracking (MPPT) algorithm with an example.	(8)	CO2
3c)	Differentiate between off-grid and grid-synchronized inverter systems.	(8)	CO2
	OR		
3d)	Discuss the role of Maximum Power Point Tracking (MPPT) in a hybrid PV-wind system. How does it differ for wind turbines and PV arrays?	(8)	CO2
Question No. 4			
4a)	Describe the control schemes of a single-phase grid-connected PV inverter.	(8)	CO3
	OR		
4b)	Explain transformer-less inverter advantages and safety challenges.	(8)	CO3
4c)	Discuss the role of energy storage systems in wind/solar integrated designs and Interpret the system reliability.	(8)	CO3
	OR		
4d)	Explain the operation of a grid-connected single-phase PV inverter using a block diagram.	(8)	CO3
Question No. 5			

5a)	Explain the concept of smart Grid in the power system network.	(8)	CO1
	OR		
5b)	List and explain smart grid technologies used for protection and control.	(8)	CO1
5c)	What is a Phasor Measurement Unit (PMU) and how is it used in wide-area monitoring?	(8)	CO1
	OR		
5d)	Compare the difference between Conventional Grid and Smart Grid.	(8)	CO1

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