Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

M.E DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025

Second Semester

Power Systems Engineering

PS4005/PPSE2408 - Wind and Solar Energy Systems

Regulations – 2021/2024

Duration : 3 Hrs ***Maximum : 100 Marks***

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	List the components of a wind energy conversion system.	L1	1	2
2.	Differentiate between horizontal-axis and vertical-axis wind turbines.	L2	1	2
3.	What are the characteristics of induction generators in wind energy systems?	L1	2	2
4.	How does a grid-connected wind energy system differentiate from standalone wind energy systems?	L1	2	2
5.	Draw and label the I-V characteristics of a photovoltaic cell.	L1	3	2
6.	Illustrate how irradiance affects the performance of a PV cell.	L2	3	2
7.	Define maximum power point tracking (MPPT).	L1	4	2
8.	Enumerate the advantages and disadvantages of photo voltaic solar energy conversion.	L2	4	2
9.	State the advantages of Building Integrated PV (BIPV) systems.	L1	5	2
10.	What are the challenges in integrating wind farms into the power grid?	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	Analyze the fundamental principles of wind energy conversion and evaluate the key factors influencing wind power generation efficiency.	L4	1	16
		Or			
	b	Synthesize the aerodynamic principles to design and justify efficient wind turbine blades for optimal performance.	L4	1	16
12.	a	Critically evaluate the operational mechanism of doubly-fed induction generators (DFIG).	L5	2	16
		Or			
	b	Develop a control strategy for managing real and reactive power in	L5	2	16

wind energy systems.

13.	a	Compare the various types of semiconductor materials used in PV cells, and evaluate their performance characteristics for solar energy conversion.	L3	3	16
		Or			
	b `	Analyze the effect of temperature and irradiance on PV cell efficiency and propose optimization techniques to enhance performance under varying environmental conditions.	L3	3	16
14.	a	Design a standalone photovoltaic system by selecting appropriate components and justify your choices based on system requirements and environmental conditions.	L4	4	16
		Or			
	b	Evaluate the role of power conditioning and energy storage in photovoltaic systems and propose integrated solutions for improved energy reliability and quality.	L4	4	16
15.	a	Assess the technical and operational challenges associated with integrating large-scale wind farms into the power grid and formulate effective mitigation strategies.	L4	5	16
		Or			
	b	Analyze the design and operational differences between Building Integrated Photovoltaic (BIPV) systems and conventional rooftop PV installations.	L4	5	16