

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026****Second Semester****Power System Engineering****PPSE2405 - RENEWABLE ENERGY AND GRID INTEGRATION****Regulations - 2024****Duration : 3 Hrs****Maximum : 100 Marks****PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

Q. No	Questions	BLT	CO	Marks
1.	Define matrix converters.	L1	1	2
2.	Point out the environmental impact of renewable energy systems.	L1	1	2
3.	Classify the different types of solar cells.	L2	2	2
4.	Identify the role of charge controllers in standalone solar PV systems.	L2	2	2
5.	A horizontal-axis wind turbine has a diameter of 5m. When the wind speed unaffected by the turbine is 10m/s, the turbine rotates at 300rpm and produces 5kW of mechanical power. Estimate the tip speed ratio.	L2	3	2
6.	Construct the power curve of a wind turbine and mention different regions.	L2	3	2
7.	Identify the impact of shading on MPPT performance in solar PV systems.	L2	4	2
8.	List out the common MPPT algorithms used in wind mill systems.	L1	4	2
9.	Interpret the significance of grid management in hybrid systems.	L2	5	2
10.	Define fuel cell and give its applications.	L1	5	2

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

Q.No	Questions	BLT	CO	Marks
11.	a i Explain the concept of grid stability and its relation to renewable energy penetration.	L2	1	8
	ii Outline the structure of Indian Electricity grid codes.	L2	1	8
	Or			
	b Describe the different types of power electronic converters used in renewable energy systems.	L2	1	16
12.	a i Explain the photovoltaic effect and the working principles of a solar cell.	L3	2	8
	ii Distinguish between stand-alone PV systems and grid-connected PV systems.	L3	2	8
	Or			
	b Elaborate the design process of a PV system, including load calculation, array sizing, and battery sizing.	L3	2	16
13.	a Name the five different stages of wind speed and explain its various speed control strategies with a neat power versus speed characteristics curve of variable -speed wind machines.	L3	3	16
	Or			
	b i Compare the working principles of Induction Generators and PMSG in	L3	3	8

wind systems.

	ii	With a neat block diagram explain the grid connected double output induction generator system.	L3	3	8
14.	a	Choose the application of MPPT in wind energy systems to experiment with including pitch control and yaw control	L4	4	16
		Or			
	b	Apply a MPPT system for a 1 kW solar PV installation using a commercial MPPT controller. Evaluate the system's performance and efficiency.	L4	4	16
15.	a	Discuss in detail about the different energy storage technologies and point out the necessity of hybrid storage systems.	L4	5	16
		Or			
	b	Analyze the benefits, challenges and applications of wind-diesel and wind-PV configuration in achieving reliable power supply.	L4	5	16