

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025***Sixth Semester**Electrical and Electronics Engineering***EE3033 - Hybrid Energy Technology***Regulations - 2021***Duration : 3 Hrs****Maximum : 100 Marks****PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

Q.No	Questions	BLT	CO	Marks
1.	Define hybrid energy systems.	L1	1	2
2.	What are the major types of solar photovoltaic (PV) systems?	L1	1	2
3.	Classify the different reference frames used in the analysis of electrical machines.	L2	2	2
4.	State the working principle of a Doubly Fed Induction Generator (DFIG).	L2	2	2
5.	Identify the various challenges in integrating solar PV systems with the grid.	L1	3	2
6.	Mention the factors influencing the selection of an inverter for SPV systems.	L1	3	2
7.	Compare the performance of isolated and non-isolated bi-directional converters.	L2	4	2
8.	What are grid-interactive inverters? Identify their role in hybrid energy systems.	L1	4	2
9.	Mention the range and types of hybrid renewable energy systems.	L1	5	2
10.	What are the important performance parameters used to evaluate hybrid renewable energy systems?	L1	5	2

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

Q.No	Questions	BLT	CO	Marks
11.	a i Show the configuration and working of a Solar-Wind-Fuel Cell-Diesel hybrid energy system.	L2	1	10
	i Explain the operation of a Wind-Biomass-Diesel hybrid energy system.	L2	1	6
	Or			
	b i Discuss the current Indian energy scenario in terms of conventional and renewable energy sources.	L2	1	10
	i Describe the operating principles of hydrogen fuel cells.	L2	1	6

12.	a	Explain the construction and working principle of a Squirrel Cage Induction Generator (SCIG).	L2	2	16
		Or			
	b	Illustrate the construction and working principle of a Permanent Magnet Synchronous Generator (PMSG).	L2	2	16
13.	a	Analyze the construction and working of a buck-boost converter with a neat circuit diagram and its significance in solar PV applications.	L4	3	16
		Or			
	b	Demonstrate the construction and working of a stand-alone solar PV system with its components and applications.	L4	3	16
14.	a	Elaborate the different types of power converters used in hybrid energy systems.	L3	4	16
		Or			
	b	Examine the different types of PWM techniques used in inverters.	L3	4	16
15.	a	What are the different cost components involved in hybrid renewable energy systems? Explain the economic feasibility assessment methods for hybrid renewable energy systems.	L2	5	16
		Or			
	b	Describe the operational mechanism of a Micro-Hydel-PV hybrid energy system. Outline the challenges associated with seasonal variations in Micro-Hydel-PV systems.	L2	5	16