DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

IV B.Tech, I Semester, Academic Year: 2026-27

Course Name : **POWER ELECTRONIC APPLICATIONS TO RENEWABLE ENERGY SYSTEMS" (23EE701)**
L – T – P : **3– 0– 0**
Course Instructor : **Mr.M.Nataraj**

Prerequisites: Power Electronics, Renewable Energy Sources

Course Objectives:

- To impart knowledge on different types of renewable energy systems.
- To analyze the operation of electrical generators used for the wind energy conversion Systems.
- To know the operation of power converters and PV systems operation

Course Outcomes:

- Proficiently demonstrate various renewable energy technologies utilized for electrical power generation.
- Explain the structure and function of multi string and module integrated inverters.
- Analyze the operating principles of different types of wind generators and identify suitable converters (AC-DC, DC-DC, AC-AC) for renewable energy systems.
- Explain the operating principles of DFIG's and also describe modern control methods for DFIG Based WECS.
- Interpret and analyze various wind and photovoltaic (PV) systems, including stand-alone, grid-connected, and hybrid configurations, showcasing a comprehensive understanding of renewable energy applications.

UNIT WISE QUESTION BANK

Unit-1

S.No	Questions	BT	CO	PO
	Part -A (Short Answer Questions)			
1	Define a PV module and mention its main components.	L1	CO1	1
2	What is a PV array? How is it different from a PV modu	L1	CO1	1
3	What is partial shading in a solar cell?	L1	CO1	1
4	Why does partial shading reduce the output power of a P module?	L1	CO1	1
5	What is the function of a bypass diode in a solar PV syst	L1	CO1	1
6	Define Maximum Power Point Tracking (MPPT).	L1	CO1	2
7	What is the role of a Power Conditioning Unit (PCU) in s energy systems?	L1	CO1	2
8	Explain the basic principle of the Perturb and Observe (P MPPT method.	L2	CO1	2
9	What is the Incremental Conductance (INC) method used solar PV systems?	L2	CO1	2
10	What are the functions of a battery charge/discharge cont	L1	CO1	2

S.No	Questions	BT	CO	PO
	Part -B (Long Answer Questions)	L1	CO1	1
1	Explain the construction and working principle of module and PV array with neat diagrams.	L1	CO1	1
2	Discuss the effects of partial shading on solar cells PV modules. Explain the role of bypass diodes in reducing shading losses.	L1	CO1	1
3	Describe the characteristics and applications of diodes used in solar photovoltaic systems.	L1	CO1	2
4	Explain the working of a Power Conditioning Unit	L1	CO1	2

	(PCU) in renewable energy systems with a block diagram.			
5	Describe the concept of Maximum Power Point Tracking (MPPT). Why is MPPT important in sola PV systems?	L1	CO1	2
6	Compare Perturb and Observe Method and Incremental Conductance Method used in MPI techniques.	L2	CO1	3
7	Discuss different types of losses occurring in F systems due to shading and environmental conditions	L2	CO1	2
8	Describe the role of converters and controllers in improving the efficiency of solar photovoltaic systems.	L2	CO1	2
9	Two identical solar modules are connected in series. Each module produces 20 V and 5 A under normal conditions. One module become partially shaded and its current reduces to 2 A. Calculate: 1. String current without bypass diode 2. Total output power under shaded condition 3. Explain how bypass diode improves th situation	L2	CO1	2
10	A solar PV array is designed using 20 PV mod Each module has a rating of 250 W, 30 V, and A. The modules are connected as 5 modules in series and 4 such strings in parallel. Calculate: 1. Array output voltage 2. Array output current 3. Total output power of the array	L3	CO1	3