R22 Regulation Subject code: **E253PC2**

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

M.Tech III Semester Regular Examinations, January 2025

PHOTOVOLTAIC SYSTEMS

(CSE)

Maximum Marks: 60 Date:01.02.2025 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

	Part-A	CO	Bloom Tx
All the following questions carry equal marks	(10x1M=10 Marks)		
1.a)	Draw the I-V characteristics of PV cell?	1	2
b)	Draw the equivalent circuit of solar cell?	1	2
c)	Define solar cell and module?	1	1
d)	Write any two merits of amorphous solar cell technologies?	1	2
e)	What do you understand by temperature coefficient?	2	2
f)	Define the curve correction factor	2	1
g)	What is a central inverter? Draw a diagram.	3	2
h)	What is the significance of balance of PV systems?	3	2
i)	Define the Maximum Power Point Tracking curve?	4	2
j)	What is the significance of P&O method in MPPT?	4	2
	Part-B		
Answer All the following questions.	(5X10M=50Marks)		Bloom Tx
2	A. Write a short note on Solar Geometry? [5M]	1	2
	B. Explain in detail about the Instruments are used in the measurement of solar radiation. [5M]	1	2
	OR		
3	A. Calculate new value output current for solar cells of area 20, 30, 50, 80 and 100 cm^2, when current density of cell is 3 mA/cm^2. [5M]	1	3
	B. Explain in detail about the Solar Spectrum. [5M]	1	2
4	A. Explain design requirements of solar cell. [5M]	1	2
	B. Explain in detail about the parameters of solar cells. [5M]	1	2
	OR		
5	A. Explain how solar photovoltaic cell generates electricity in detail. [5M]	1	2
	B. A solar cell having Fill factor (FF) 68% gives 0.6 V at maximum power point at STC. The cell gives 3 A short circuit current and 0.7 V open circuit voltage. What is the current at maximum power point of the solar cell? [5M]	1	3

6	A. Explain in detail about the Flat plate arrays with a neat sketch. [5M]	2	2
	B. Write about module interconnection and cabling of solar plate. [5M]	2	4
	OR		
7	A. Explain in detail about the Lightning protection in solar forms. [5M]	2	2
	B. Explain in detail about the determination of temperature coefficients of the PV. [5M]	2	2
8	Find the total number of the PV modules for a factory which contains 1 hp motor (1 hp = 747 W) operating for 4 hours a day, 8 tube lights, each of 50 watts operating for 7 hours a day. Consider a 1-day autonomy for battery. Consider, Inverter Efficiency 93%, system voltage 24 V, Battery DoD = 50%, Battery efficiency = 95%, equivalent daily sunshine hours = 4.5 hours, PV module of 200 Wp. Battery capacity 150 Ah. [10M]	3	4
	OR		
9	What are the different types of Photo-voltaic systems? Draw the schematic diagram of each PV system? [10M]	3	2
10	Explain Perturb and Observe (P&O) technique for MPPT of solar PV system with flow chart and circuit diagram. How is it implemented in practice. [10M]	4	2
	OR		
11	A. Distinguish between the Incremental conductance method and Hill climbing method. [5M]	4	2
	B. Explain in detail about the different components of Grid connected PV systems. [5M]	4	2