



M.Tech III Semester Regular Examinations, February 2024
PHOTOVOLTAIC SYSTEMS
(CSE)

Maximum Marks: 60

Date: 17.02.2024 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 P-V characteristics of solar cell?	1	2
b)	Draw the equivalent circuit of solar cell?	1	2
c)	Define solar array and module?	2	1
d)	Write any two demerits of Monocrystalline silicon solar cells?	2	2
e)	What is the principle of flat plate arrays?	2	2
f)	Write the formula for curve correction factor?	2	1
g)	Define the series string inverter? Draw a diagram?	3	2
h)	What is the necessity of battery sizing?	3	2
i)	Why is Maximum Power Point Tracking technique is used for solar power generation?	4	2
j)	What is the significance of Hill climbing method over Incremental conductance method in MPPT?	4	2
Part-B			
Answer All the following questions. (5X10M=50Marks)			
2	Write a short note on the below given parameters, i) Solar altitude angle, ii) Zenith angle, iii) Air mass, iv) Solar azimuth angle, v) Solar declination [10M]	1	2
OR			
3	Explain in detail about the solar equivalent circuits and their characteristics with neat sketches. [10M]	1	2
4	A. Explain in detail about the different Solar cell technologies? [5M]	1	2
	B. Explain in detail about the Photovoltaic module. [5M]	1	3
OR			
5	A. A solar cell having an area of 25 cm ² gives 0.85 A current at maximum power point and 0.55 V at maximum power point at STC. The cell gives 0.9 A short circuit current and 0.65 V open circuit voltage. What is the maximum power point fill factor and efficiency of the solar cell? [5M]	1	3
	B. Explain in detail about the Encapsulation in solar systems? [5M]	1	3

6	A. Explain in detail about the Module interconnection and cabling in PV modules? [5M]	2	2
	B. Explain in detail about the performance measurement using natural sun light and simulator? [5M]	2	4
OR			
7	A. List out the merits and demerits of solar Flat plate arrays? [5M]	2	2
	B. Explain in detail about the solar Supporting structures? [5M]	2	2
8	Find the total number of the PV modules and battery for a house which contains 3 fans of 70 watts each running for 4 hours a day, 3 tube lights of 35 watts each running for 8 hours a day and a refrigerator of 250 watts running for 6 hours a day (consider battery autonomy 1 day). Consider, Inverter Efficiency 93%, system voltage 12 V, Battery DoD = 50%, Battery efficiency = 95%, equivalent daily sunshine hours = 4.5 hours, PV module of 160 Wp. Battery capacity 150 Ah.[10]	3	4
OR			
9	Explain in detail about the design methodology for SPV system. [10M]	3	2
10	Explain Incremental conductance, (IC) 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. List out the merits and demerits of Hill climbing method over Perturb and observe? [5M]	4	2
	B. Describe the working principle of grid connected SPV system with battery storage. [5M]	4	2