

All relevant charts are supplied and only chart supplied need be used.

DRAW DIAGRAMS TO EXPLAIN YOUR ANSWER WHERE-EVER REQUIRED

BE BRIEF AND ANSWER TO THE POINT

ASSUME MISSING DATA SUITABLY IF REQUIRED

Some equations are given and can be used while answering.

1. Draw typical house hold load and possible PV generation against time in a day. Hence write expressions for E to utility, E from utility and LCC. 5
2. Calculate the incident angle modifier for normal incident radiation? Calculate T_{cell} at an ambient temperature of 37°C for incident radiation of 900W/m^2 , with air circulation on both sides of collector, given nominal operating cell temperature as 47°C . 5
3. Draw an equivalent heat transfer model for a flat plate collector showing all resistances. Given the normal incident radiation is 700W/m^2 , the transmissivity of cover and absorptivity of absorber surface being 0.85 and 0.93 respectively, the mass flow rate of water through the collector as 0.1kg/s , specific heat of water as 4.2kJ/kg K , calculate the useful heat available, when conduction heat loss per degree for unit area of collector is $4.2\text{W/m}^2\text{K}$, for collector area of 10m^2 and temperature differential with ambient is 20°C . Assuming all useful heat is available for storage in the water, what is the temperature difference between the incoming water and outgoing water? 10
4. Explain the process of calculating LEED rating on various criteria? 7
5. Explain the physical process of modification of the site climate by trees by bringing in changes in temperature and relative humidity. 6
6. Given the following data calculate the planet equivalent 3

	Ecological Footprint	Biocapacity
Cropland	3,010,000	3,305,000
Grazing Area	914,000	1,683,000
Fishing Grounds	936,000	869,000
Forest	1,438,000	4,898,000
Carbon	7,263,000	
Built-up Area	483,000	483,000

Handwritten calculations:

$$\frac{0.298}{1.253}$$

7. What are components of embodied energy?, explain how durability is related to life cycle embodied energy? 4

Handwritten notes:
 15-
 15-
 a-
 39
 15
 (45)

Handwritten notes:
 15
 15
 3
 45
 a
 (50)
 37
 3