

WOLL UNIVERSITY
INSTITUTE OF TECHNOLOGY MECHANICAL
ENGINEERING DEPARTMENT

1. Demonstrate safe and proper use of required tools and equipment for solar photo voltaic system? Write merit and demerit of renewable and non renewable energy technology. List and explain application area of renewable energy (solar, biogas, wind, hydro). How to manage and protect environmental effect of conventional energy used.
2. A DC load is connected to 24 V and the current is 2 A. What is the power of the load?
3. A LED lamp rated 9 W is on for 40 minutes and TV of 60 W is on for 2 hours. How much energy has been used?
4. You are using a 150 watts solar module and nominal voltage is 12V. You have calculated you need a 3,000 watts solar array with a system voltage of 48V. What will be the configuration of the array? That is how many modules in series and how many parallel strings?
5. Home consumes 4,000 kWh per year. Average peak sun hour per day for a south-facing array = 6.5 Overall average system efficiency factor 66%. Calculate the array size needed to offset annual energy consumption. Assume a cost of birr 0.50/Watt (installed) estimated cost of array. Now again you have select 175watt size of array, determining the number of solar modules needed to produce the required power.
6. Biogas system design for cooking for a family of six members is considered here. The system design includes the estimation of total gas required, amount of feedstock (or dung), required and the number of animals required to have feedstock of a given amount. Design digester and gasholder size.

No	Parameter	Value
1	Caw	8kg/day
2	Average gas production from dung	40Lit/kg
3	Retention period	40day
4	biogas required	400lit/day/person

7. Assume that annual energy requirement of an industry is 15000 kWh; we calculate that what will be the size of wind turbine that is required to be installed to meet the energy requirement. Following assumptions are taken into account for estimation:
 - Annual energy requirement= 15000 kWh
 - Propeller type wind machine is used
 - Coefficient of performance =0.40
 - Wind speed at 15 meter height is 5 meter/sec
 - Density of air =1 kg/m³

- Capacity factor = 0.35 (i.e. 35% of the time, wind machine is producing energy at rated power)
- Number of hours in a year 8760 hours.

Please give care for yourself (Covid_19)