Department of Mechanical Engineering
Academic Year 2021 – 2022 (Odd Semester)

Degree, Semester & Branch: VII Semester B.E. Mechanical
Course Code & Title: ME8072 Renewable Sources of Energy
Name of the Faculty member(s): Mr.R.Arun Kumar, AP/Mechanical

Innovative Practice Description

- **Unit / Topic:** Unit II / Solar Energy
- **Course Outcome:** CO6
- **Topic Learning Outcome:** TLO6
- **Activity Chosen:** Design a Solar PV System for household
- **Justification:** Apart from regular teaching learning process, students were taught to design a solar PV system for their house hold appliances. This will help in enhancing their knowledge as well as skill in Solar PV design.
- **Time Allotted for the Activity:** Spent 20 minutes in class for playing and explaining the procedure and gave two week of time for preparing the design report as assignment
- **Details of the Implementation:**

  The video for designing a PV system was played and explained in parallel. Then a sample PV design was explained to the students for the electrical utilities in the class room. Then the students were given two weeks of time to audit the electrical appliances in their respective homes. After auditing the students were asked to submit an assignment a report for designing the solar PV system for their individual households.

- **PO / PSO mapping:**

Innovative Practice	**PO8 (Ethics)**	**PO9 (Individual & Team work)**	**PO10 (Communication)**	**PO12 (Lifelong learning)**	**PSO3 (Design thermal system)**
	1	3	2	2	3
Justification for correlation	Timely submission and plagiarism was checked for the report submitted	Report was submitted by students on designing a solar system, hence PO9 is mapped at level 3	In report technical information will be interpreted in basic level and the same will be presented as a report. So, PO is mapped at level 2	Report enables students to analyze viability through technical content	Students will design a solar system for the given location by analyzing various implementation parameters

(1 – Low 2 – Moderate 3 – High)

- **CO – PO / PSO mapping:**

CO	PO5	PO8	PO9	PO10	PO12	PSO3
CO6	3	1	3	2	2	3

(1 – Low 2 – Moderate 3 – High)

- **Images / Screenshot of the practice:**

- **Reflective Critique:**
  - ***Feedback of practice from students and other stakeholders:***

    Based on the oral feedback collected from the students, they expressed happiness in learning to design a Solar PV system

  - ***Benefit of the practice:***

    Students were able to attend the Part C question in IAT II for designing a PV system for given conditions.

References: Solar News and Knowledge YouTube Channel – Step 14 – Solar Home System Design in just 10 minutes (https://www.youtube.com/watch?v=8Eiel2_e17Q&t=24s)

CO6: Student will be able to build a solar PV system plan for a given condition

RENEWABLE SOURCE OF ENERGY ASSIGNMENT

V. SARVESH BALAJI
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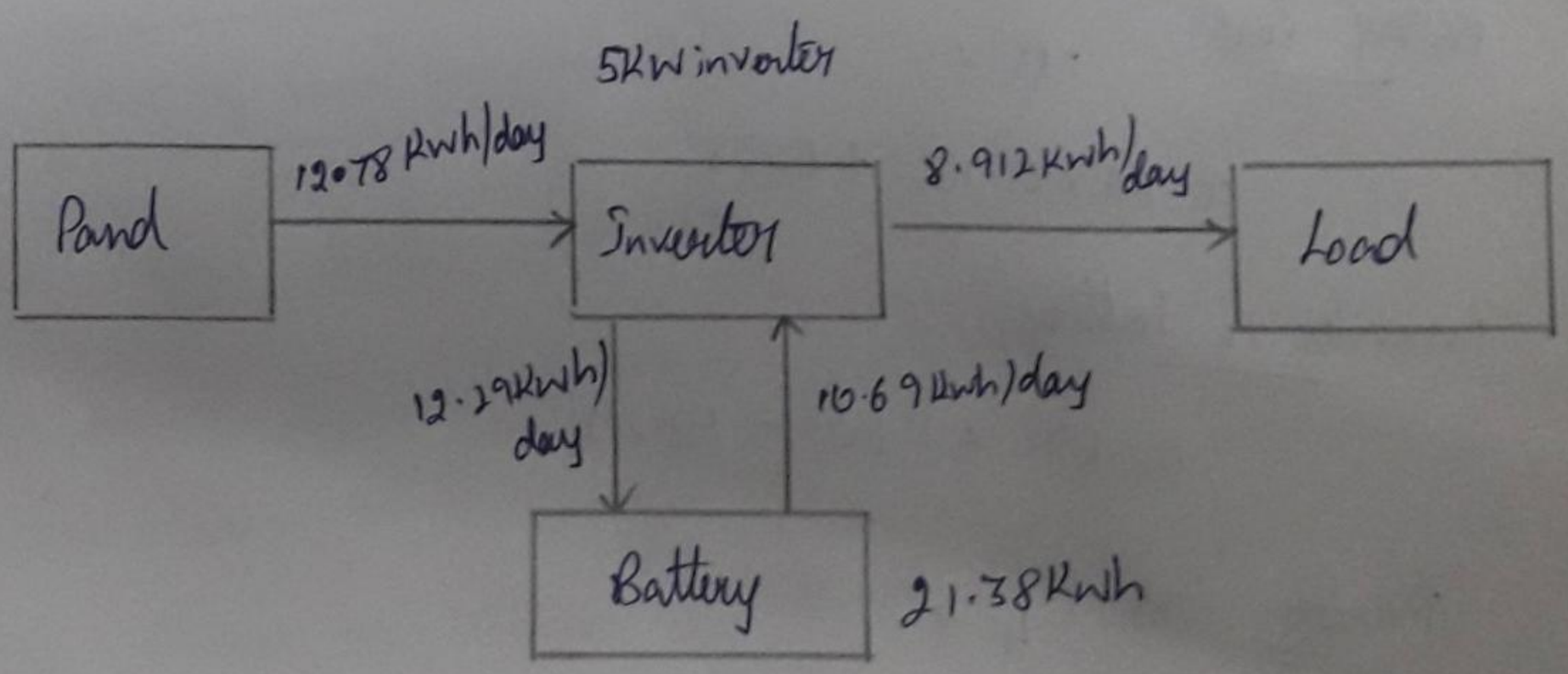
S.NO	APPLIANCE NAME	DC POWER (W) (a)	NO. OF APPLIANCES (b)	DAILWAGE HOURS (c)	TOTAL AC POWER (axb)	TOTAL AC ENERGY (axbxc)
1)	Tube light	40	3	4	120	480
2)	Fan	55	2	10	110	1100
3)	Tv-40"	45	1	5	45	225
4)	Refrigerator	120	1	24	120	2880
5)	Washing machine	2100	1	2	2100	4200
6)	Plug Point for charging	3	3	3	9	27
					Power = 2504	8.912 KW/day.



Inverter loss :- 20%.

$= 8.912 \times 0.2$

$= 1.7824$

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Battery to inverter :-

$= 8.912 + 1.7824$

$= 10.6944.$

Battery $= \frac{10.69}{0.5} = 21.38$ Kwh Storage Load 50%.

Battery Storage $= 21.38$ Kwh Storage.

Battery are available in V×Ah

12V x 200 Ah $= 2.4$ Kwh

No. of batteries required $= \frac{21.38}{2.4} = 8.908$

No. of Batteries $= 9$

For 1/2 days Storage.

Battery Storage $= 21.38 \times 0.5$

$= 10.69$ Kwh

Battery loss $= 15\%$.

$10.69 \times 0.15 = 1.6035$

Inverter to battery

$10.69 + 1.60 = 12.29$

Inverter loss 4%.

$= 12.29 \times 0.04.$

$= 0.4916.$

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Panel to inverter

$12.29 + 0.4916 = 12.78$ Kwh/day.

Solar Panel loss 25-1.

$= 12.78 \times 0.25$

$= 3.1954$

Total energy Solar Panel

$= 12.78 + 3.195 \Rightarrow 15.975$ Kwh/day

A town given location = 6 Kwh/m²/day

Hours of Solar radiation = 6 h/day.

Power of Solar Panel $= \frac{15.975}{6} = 2.66$ Kw.

250w Panel from market

no. of Panel required $= \frac{2660}{250} = 10.64 \simeq 11$

No. of Panel = 11 Panels

Solar home System Summary

Load energy required = 8.912 Kwh/day

Inverter Power rating = 5Kw.

Battery Storage = 21.38 Kwh, 9 batteries, 12V, 200Ah

Solar Panel = 2.66Kw, 11 Panels, 250w.

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