Report on Student Centric Teaching Learning Methodologies implemented

1. **Academic Year**: 2022-23	2. **Semester:** IV-II
3. **Course Code:** 1003194251	4. **Reg:** VR 19
5. **Course:** Green Engineering Systems	6. **Class:** IV MECH-A
7. **Topic:** Photo voltaic energy conversion – types of PV cells, I-V characteristics	

Strategy: Case Study

Introduction: Photovoltaic (PV) energy conversion is a rapidly growing field that utilizes solar energy to produce electricity. PV cells are the building blocks of PV systems and are made of semiconductor materials such as silicon, gallium arsenide, or cadmium telluride. These cells convert sunlight into electrical energy by the photovoltaic effect. In this case study, we will explore the different types of PV cells and their I-V characteristics in more detail, as well as the factors that affect their performance, including temperature and shading. We will also discuss some real-world applications of PV systems and their potential for sustainable energy generation.

Case study scenario: A small village in a remote area of a developing country wants to provide electricity to its residents using solar energy. The village has abundant sunlight but no access to the power grid. We have to hire consultants to help the village choose the best PV system for their needs.

Figure 1: Case study activity by students at PV site.

Figure 2: Case study activity by students.

Problem: Selecting the Best PV System for a Remote Village: Understanding Types of PV Cells and their I-V Characteristics.

No of groups: 12

Team size: 04

Time Allotted: Two-weeks

Creative Solution: After conducting a site assessment and reviewing the energy needs of the village, we have determined that a PV system is the most feasible and cost-effective solution. To select the best PV system, we need to consider the types of PV cells available and their I-V characteristics.

There are three main types of PV cells: monocrystalline, polycrystalline, and thin film. Monocrystalline cells are the most efficient but also the most expensive. Polycrystalline cells are less expensive but have a lower efficiency rate. Thin-film cells are the least expensive and flexible, but they have the lowest efficiency rate.

Considering the budget constraints of the village, we recommend the use of polycrystalline cells as they offer a good balance between efficiency and cost-effectiveness. We will install a PV system with a capacity of 5 kW and use 20 polycrystalline cells with a maximum power output of 250 W each.

Impact: Firstly, the case study highlights the potential of PV systems in providing access to sustainable energy in remote areas with abundant sunlight. The case study shows how a small village in a developing country can benefit from the installation of a PV system, improving the quality of life and economic opportunities of the residents.

Secondly, the case study emphasizes the importance of understanding the different types of PV cells available and their I-V characteristics in selecting the best PV system for specific needs. By considering the budget constraints and energy needs of the village, the case study recommends the use of polycrystalline cells, which offer a good balance between efficiency and cost-effectiveness.

Thirdly, the case study highlights the impact of temperature and shading on the performance of the PV system and how proper design and installation can optimize energy output. The installation of bypass diodes and positioning of the cells in a shaded area can significantly improve the efficiency and reliability of the PV system.

Conclusion: By conducting a site assessment and reviewing the energy needs of the village, we have determined that a PV system is the most feasible and cost-effective solution. We have recommended the use of polycrystalline cells due to their good balance between efficiency and cost-effectiveness. We have also designed the PV system to operate at the maximum power point (MPP) and installed bypass diodes to minimize the impact of shading on the system's performance.

The case study demonstrates the potential of PV systems in providing sustainable energy solutions to remote areas with abundant sunlight. By adopting renewable energy solutions, communities can improve their quality of life and economic opportunities while reducing their dependence on fossil fuels and contributing to the fight against climate change.

Assessment sheet

Sl. No.	Reg. No	Name	Sec	Batch
1	19L31A0312	BUSAKALA VAMSI KRISHNA	A	1
2	19L31A0321	CHILLA VIJAYKUMAR	A	
3	19L31A0322	VADAPALLI CHAITANYA VARMA	A	
4	19L31A0342	BANDELA SANJEETH	A	
5	19L31A0360	PILLA DURGA VENKATA NARASIMHA MURTHY	A	2
6	19L31A0390	AMARAPU SHYAM SUNDAR	A	
7	19L31A03C3	SRIKAKULAPU DILEEP	A	
8	19L31A03C8	MALLESWARAPU SHYAM BABU	A	

9	19L31A03D5	RAVI JAYA HARSHA	A	3
10	19L31A03F5	KUTCHERLAPATI NARENDRA GANAPATHI VARMA	A	
11	19L31A03F7	SURLA NAVEEN	A	
12	19L31A03G4	SAMPATHI RAO NITESWARA SAI	A	
13	19L31A0350	KATTA CHANDRA SEKHAR	A	4
14	19L31A0394	VICKY KUMAR SINGH	A	
15	19L31A03G9	VEERLA JYOTHISWAR	A	
16	19L31A03H5	MANTRIPRAGADA RAMA VAMSI ANUDEEP	A	
17	19L31A03I6	KARANAM ARAVIND SWAMY	A	5
18	19L31A03K5	GURI HARSHAVARDHAN	A	
19	19L31A03L6	OMMI PAVAN SAI	A	
20	19L31A03N7	NAGULA HEMANTH KUMAR	A	
21	19L31A0335	KOKKIRAPATI NAVEEN RATNA RAJU	A	6
22	19L31A0349	GUNNA SUNIL	A	
23	19L31A03A5	KASIMAHANTHI LAHARI	A	
24	19L31A03A7	NUDURUPATI SAI SRAVANTH	A	
25	19L31A03D6	ANDIBOYINA SASI KIRAN	A	7
26	19L31A03F6	KATTA BHEEMA SHANKAR	A	
27	19L31A03I2	INDALA VAMSI KRISHNA	A	
28	19L31A03L5	NADUPURI ARUN KUMAR	A	
29	19L31A03O5	KOTA KUSH KUMAR	A	8
30	19L31A03P9	AKKIREDDY NAVEEN	A	
31	19L31A03M3	BOKAM KALYAN	A	
32	19L31A03M9	BONDA ABHISHEK	A	
33	19L31A03P2	CHITIKIREDDY HEMANTH KUMAR	A	9
34	19L31A03P6	RAMALINGAM SAI ESWAR	A	
35	19L31A0311	CHANDURI GANGADHAR VISHNU VARDHAN	A	
36	19L31A03A0	DASARI M M S V S ANAND	A	
37	19L31A03E1	TATIKONDA HARISH	A	10
38	19L31A03G5	MATHA SURYA CHAITANYA	A	
39	19L31A03I7	DWARAPUREDDI B G RAM KUMAR	A	
40	19L31A03K4	MAKANA SAI TEJA TARUN	A	
41	19L31A03L1	ANUPOJU CHANDRA SEKHAR	A	

42	19L31A03H4	RAMOLU SATYA VINAY	A	11
43	19L31A03H8	BHEEMISETTI ADARSH	A	
44	19L31A03I3	PASALA SANGEETH KUMAR	A	
45	19L31A03M2	PYLA SHEKHAR NAIDU	A	12
46	19L31A03N6	YENUGUTHALA NAVEEN	A	
47	19L31A03O0	BUDUMURU GOPI	A	
48	19L31A03Q6	BORRA SRINIVASA RAO	A	

Documentation for case study submitted by the students with final solution got from all the groups. Out of all the group case study reports Group-9 report is selected as the best-case study report. The best group report is documented.

Activity Outcomes to POs/PSOs Mapping:

S.No	Activity Outcomes	Mapping to POs and PSOs
1	Research	PO1, PO2, PO3
2	Collaboration	PO6
3	Communication	PO10
4	Problem-solving	PO3
5	Critical thinking	PO4
6	Creativity	PO1, PO2, PO3

POST IMPLICATION:

1. Student's logical thinking is improved
2. Solar PV energy applications
3. Improved team spirit

Faculty **HoD-MECH**

Report on Student Seminar

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6. **Class:** IV MECH-A

Student Name: CHANDURI GANGADHAR VISHNU VARDHAN (19L31A0311)

Topic: Green building and energy management

Introduction: In recent years, there has been an increasing awareness of the impact of buildings on the environment and the need for sustainable solutions. The construction and operation of buildings are responsible for a significant portion of global greenhouse gas emissions, energy consumption, and waste generation. Therefore, it is essential to adopt green building practices and energy management strategies to reduce the environmental footprint of buildings while ensuring a healthy and comfortable indoor environment.

This seminar aims to provide an overview of the concepts and principles of green building and energy management, highlighting the benefits, challenges, and opportunities associated with these practices. We will discuss the various strategies and technologies available to reduce energy consumption, minimize waste generation, and improve indoor air quality. We will also explore the economic and social implications of green building and energy management, including the potential for cost savings, job creation, and community engagement.

Activity Outcomes:

1. Develop an understanding of the concepts and principles of green building and energy management, including the environmental, economic, and social benefits of these practices.
2. Gain knowledge of the various strategies and technologies available to reduce energy consumption, minimize waste generation, and improve indoor air quality in buildings.
3. Develop critical thinking skills to evaluate the feasibility and effectiveness of different green building and energy management strategies in different contexts.
4. Enhance communication skills by presenting and discussing green building and energy management topics with peers and industry experts.
5. Learn how to conduct a sustainability assessment of a building or facility, including energy audits and life cycle assessments.
6. Develop problem-solving skills by analyzing real-world case studies and identifying opportunities for green building and energy management improvements.
7. Gain insight into the regulatory and policy frameworks that influence green building and energy management practices, including building codes, energy standards, and incentive programs.

8. Learn about the different roles and responsibilities of professionals involved in green building and energy management, such as architects, engineers, contractors, and facility managers.
9. Develop teamwork skills by working collaboratively on group projects or presentations related to green building and energy management.

In conclusion, the student seminar on "Green Building and Energy Management" has provided an in-depth understanding of the importance of sustainable building practices and energy management in reducing the environmental footprint of buildings. We have explored the various strategies and technologies available to improve energy efficiency, minimize waste generation, and improve indoor air quality in buildings. We have also discussed the economic and social benefits of green building and energy management, including cost savings, job creation, and community engagement.

Through this seminar, students have developed critical thinking, communication, problem-solving, and teamwork skills by analyzing real-world case studies, conducting sustainability assessments, and working collaboratively on group projects. Students have gained insight into the regulatory and policy frameworks that influence green building and energy management practices and the different roles and responsibilities of professionals involved in the field.

Overall, this seminar has provided students with a solid foundation to become agents of change in promoting sustainable building practices and energy management. Students are now equipped with the knowledge and skills necessary to evaluate the feasibility and effectiveness of different green building and energy management strategies in different contexts, contributing to the global effort to transition to a low-carbon economy.

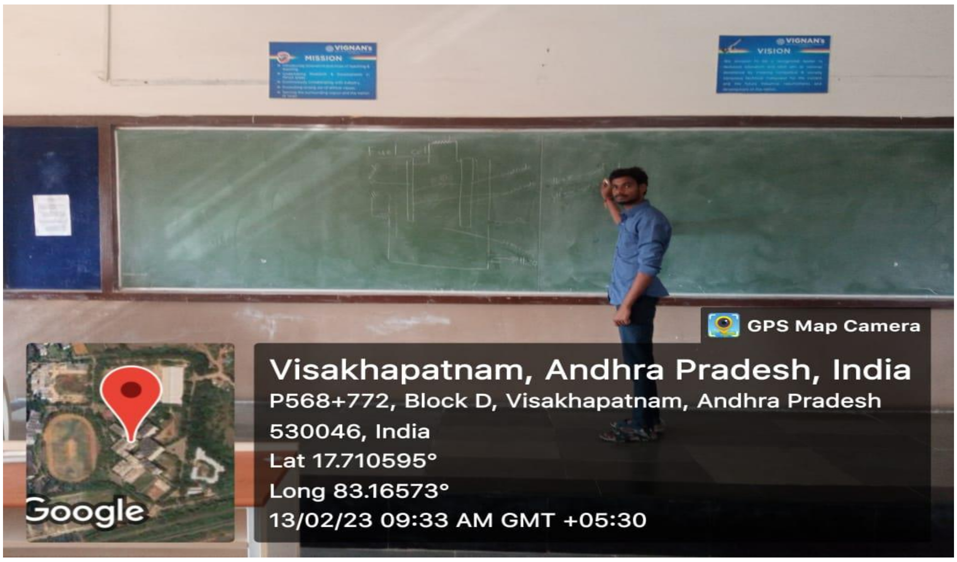

Figure: Student presenting the seminar

Impact Analysis:

- Increased engagement and participation.
- Enhanced design skills.

- Improve communication skills.
- Fostered problem-solving skills

Activity Outcome to PO Mapping:

Activity Outcome	Mapping to POs and PSO’s
Understanding the guidelines	PO1
Application of guidelines	PO1, PO3, PO4
Communication skills	PO10
Reflection and problem-solving	PO3
Collaboration and teamwork	PO9

Post Implications:

- Increased student engagement and motivation.
- Improved student understanding of design guidelines
- Preparation for real-world design scenarios

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