SYNOPSIS

1. Title of the project:

MAXIMIZED PRODUCTION OF HOT WATER USING A NOVEL ABSORBER TUBES OF A FLAT PLATE COLLECTOR

2. Name of the College and Department:

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4. Keywords:

Flat Plate Collector , Spiral Tube , Thermal Efficiency,Solar Energy.

5. Introduction:

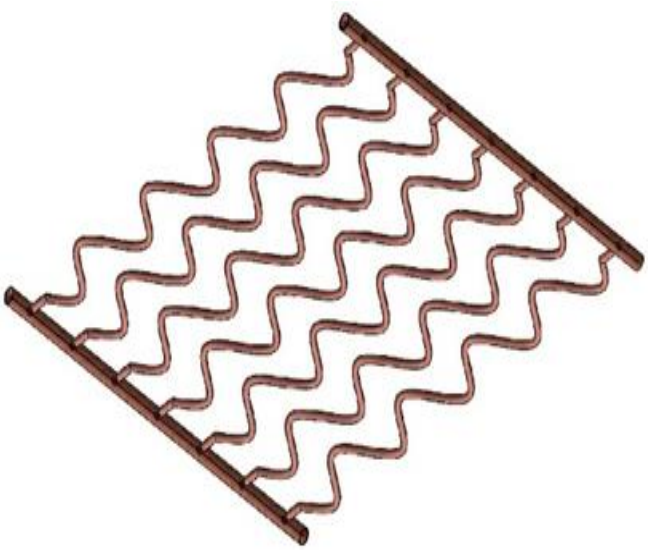
Flat Plate solar collectors (FPSC) are devices that harness both direct and diffused radiation of sun to collect solar radiation and convert it into heat energy.

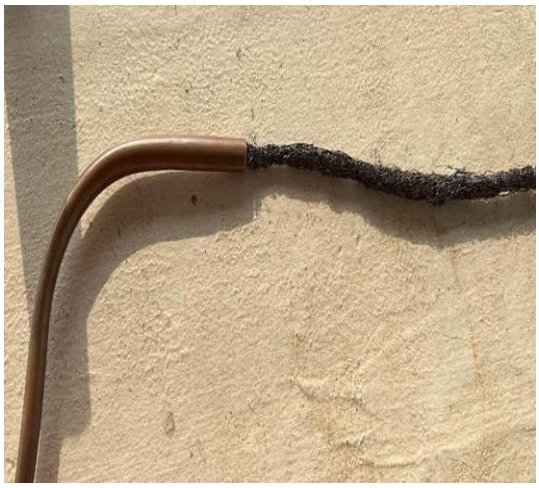
Several modifications and innovative designs have been incorporated in FPSC to improve its efficiency. The proposed work aims at improving efficiency of flat plate collector through copper foam inserted type of collector tube and thus preparing a low-cost high efficiency flat plate collector.

6. Objectives :

- To get better heat transfer.
- To achieve maximum production of hot water.
- To achieve good thermal efficiency

7. Methodology:





The setup is placed in direct sunlight without the black chrome coating and the readings are taken at different intervals of the day and a corresponding graph is plot.Similarly the same will be done after the Black Chrome Plating is done and corresponding readings are taken . Flow rate and intensity can be controlled using control knobs. Inlet temperature of water entering to collector will be noted. For each set of reading, steady state condition will be allowed to settle. Outlet temperature will be recorded as average of three readings at same conditions.Finally the calculations will be made based on the requirement.

8. Results and Conclusion:

The fabrication of the flat plate collector has been executed according to the design specifications, ensuring precision and attention to detail. To assess its performance, the modified collector was rigorously tested and compared with existing data available in theliterature, specifically the straight tube design. The results obtained from the experiments are truly remarkable and showcase the enhanced capabilities of the modified collector.

For a flow rate of 0.01 kg/s, the temperature rise reached an impressive 22 °C, accompanied by a corresponding heat transfer rate of 920.48 watts, representing a remarkable 24% increase compared to the previous design. This substantial improvement indicates the efficacy of the modifications implemented.

Moreover, at a flow rate of 0.02 kg/s, the modified collector achieved a temperature rise of 12 °C while demonstrating an impressive rate of heat transfer amounting to 1004.16 watts. The enhanced efficiency becomes even more evident as the flow rate increases.

At a flow rate of 0.03 kg/s, the modified collector showcased its exceptional performance byraising the temperature by 11 °C, accompanied by an astounding rate of heat transfer of1380.72 watts.These results highlight the outstanding thermal capabilities and potential ofthe modified flat plate collector.

The achieved outcomes not only validate the modifications made to the collector but alsoillustrate its superiority over the existing straight tube design. The improved temperature riseand heat transfer rates signify a significant advancement in harnessing and utilising solarenergy, further emphasising the potential for wider adoption of this innovative collector invarious applications.

9. Scope for the future work :

This innovative design of collector certainly offers further exploration to optimize its efficiency by adopting selective coating of collector plate along with designing it to work with advanced working fluid. Results in terms of temperature gain and efficiency are very encouraging for further research so that it can be adoptable for household sector use.