DESIGN OF LARGE SCALE SOLAR DISTILLATION AND HOT WATER SYSTEMS : EXPERIMENTAL AND THEORETICAL STUDIES

by

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TO

MY TEACHER

DR. N.C. BHAGAT

BIHAR UNIVERSITY MUZAFFARPUR

WITH ALL MY RESPECTS

CERTIFICATE

It is certified that the thesis entitled,"DESIGN OF LARGE SCALE SOLAR DISTILLATION AND HOT WATER SYSTEMS: EXPERIMENTAL AND THEORETICAL STUDIES" submitted by Yamuna Prasad Yadav is worthy of consideration for the award of the degree of 'Doctor of Philosophy and is a record of the original bona-fide research work carried out by him under my guidance and supervision. The results contained in the thesis have not been submitted in part or full to any other University or Institute for the award of any degree or diploma.

Gntiwari

(Dr. G.N. Tiwari)

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SUMMARY

The present thesis encompasses various investigations, theoretical as well as experimental, on the performance of solar distillation systems and hot water systems. Design, fabrication, installation and long term performance of a double slope fibre reinforced plastic (FRP) solar distillation plant have been presented in detail. In addition to this, performance of this plant has been compared with plants comprising of stills of various designs. It has been concluded that the single slope still performs better than the double slope still for cold climatic condition while the performance of double slope still is better than the single slope stills in summer climatic condition. A transient analysis of a single basin solar still feeding waste hot water into the basin has been carried out. Apart from this, a typical single basin solar still has been simulated by feeding hot water into the basin from a constant temperature bath; the results of simulation has been supported by the results obtained from the quasi-steady state analysis of the aforesaid still. Further, thermal modelling has been developed for a single and double basin solar still coupled to flat plate collector under thermosiphon mode. Results of this study have been compared with the results of these systems when they are uncoupled and coupled to collector under forced circulation mode. So far as the water heating systems are concerned, a detailed theoretical and experimental studies of both domestic (thermosiphon) and large scale solar water heating systems (forced circulation) have been carried out.

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