PREFACE

In many applications, heat transfer plays a vital role. Heated air is utilized in various fields. In many applications, processes based on combustion are used to heat the air by which pollution occurs. On the other hand, solar air heater is used to heat the air without resorting to combustion and thereby no questions of pollution arise. Due to the laminar sub layer on absorber plate, the efficiency is poor for solar air heaters. To destroy the laminar sub layer, artificial roughness is provided on the absorber plate. In this work, triangular protrusions as means of surface roughness on the absorber plate are used to improve heat transfer in solar air heater duct.

Chapter – 1:

In this chapter, an introduction on using artificial roughness on the surface of absorber plate to destroy the laminar sub-layer is provided.

Chapter – 2:

Literature survey is made and the problems that arise with the laminar sub-layer were identified. Different approaches to overcome the effect of laminar sub-layer have been studied. The present work contemplates to use triangular protrusions as roughness elements on the absorber plate. The aim of the research work is to find the effect of the above on heat transfer rate and thermo hydraulic performance.
Chapter – 3:
In this chapter, theoretical analysis of the boundary layer, laminar boundary layer on a rough surface and the effect of parameters, the effect of protrusions on flow structure are studied.

Chapter – 4:
This chapter explains the experimental setup to collect the data and provides the analysis of data. The experimental procedure and data collection for calculation of thermo hydraulic performance by using parameters like Prandtl number, Reynolds number, Nusselt number and Friction factor are explained.

Chapter – 5:
In this chapter, the experimental results are analyzed and discussed.

The CFD simulation, along with experimental deductions is deliberated.

The correlations for Nusselt number and friction factor are evolved by involving all the parameters on MATLAB software platform.

Chapter – 6:
Conclusions are presented in this chapter.