



SOLAR ENERGY UTILISATION

G.D. RAI

KHANNA PUBLISHERS

SOLAR ENERGY UTILISATION

By the same Author and Publishers

1. **Non-conventional Sources of Energy**
2. **Practical Thermodynamics with Questions and Answers**
(A Mechanical Engineering Laboratory Course with Viva Voce)
3. **Power Plant Technology**
(Energy Conversion Systems)

ABOUT THE BOOK

“PRACTICAL THERMODYNAMICS WITH QUESTIONS AND ANSWERS”

The purpose of this book is to provide the basic knowledge of mechanical engineering laboratory practice to the students. A practical/viva examination is conducted almost in every institution/university in *Heat power and Thermodynamics practicals*. This book deals with the :

- (i) Study of measuring instruments to be used in mechanical laboratory
- (ii) Study of the machines and,
- (iii) the experiments to be conducted on different machines.

At the end of every chapter, sufficient number of questions with answers are added. These will help in practical/viva examinations in the subject.

The book deals with the following laboratories :

1. *Steam laboratory*

- (a) steam boilers and their performance
- (b) steam engines, steam turbines, condensers and their performance testing.

2. *I.C. Engines laboratory*

- (a) General description of the engines,
- (b) Testing methods of the engines.

3. *Gas Dynamics laboratory*

- (a) General study of different types of compressors and
- (b) their testing methods.

4. *Refrigeration and Airconditioning Laboratory*

- (a) General study of the machines
- (b) Testing procedures.

5. *Heat-transfer laboratory*

- (a) Basic theory of heat transfer,
- (b) Experiments which are conducted in the laboratory.

In addition, some experiments on *wind tunnel, flow visualization* and *solar energy* are also included.

SOLAR ENERGY UTILISATION

[A TEXTBOOK FOR ENGINEERING STUDENTS]

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PREFACE TO THE FIFTH EDITION

The author is highly thankful to the reader for the warm welcome given to the previous editions of this book, and sending their appreciation and suggestions. As far as possible suggestions received have been incorporated. The present edition has been made comprehensive for increasing its utility to the students.

Most of the chapters have been reinforced with additional materials, wherever considered necessary.

Some more solved and unsolved problems are added after the relevant articles for better understanding and use of the articles.

Suggestions for the further improvements in the book, will be gratefully acknowledged.

G.D. RAI

PREFACE TO THE FIRST EDITION

The book is intended to serve as a textbook for courses in Solar Energy Engineering taught to engineering students. The aim is to provide ample information concerning all forms and topics of solar energy, being I hope, both as a textbook as well as a work of reference.

In the near future the present energy conversion systems will change drastically, due to lack of conventional fuels, the political uncertainties related to the supply of petroleum, a rising population and rapid technological advancement. Within this framework solar energy will play a prominent role. That is why this subject is being introduced in the syllabus of engineering courses of various universities.

Throughout the text, attempt has been made to present the subject matter in a simple, lucid and precise manner. Sufficient solved examples are given to illustrate the use of the equations developed in the text. The material is divided into 13 chapters and appendices. The chapters contain in this order—introductory information on solar energy applications, fundamental principles of heat transfer and the nature of solar radiation, practical and efficient methods of collecting and storing solar energy and detailed descriptions of the practical systems for heating or cooling by means of solar energy together with an analysis of their economics solar thermal power generation, solar photovoltaics and other applications are discussed.

The Government of India has also adopted the SI system of units to be in line with the other countries of the world, accordingly

problems are illustrated in SI units, together with in MKS system as well, because some universities still following MKS system.

The appendices contain tables of reference data including heat transfer properties of materials and conversion of some properties from other units of SI units.

It is regretted, however, that despite careful scrutiny of the proofs, several printing mistakes have nevertheless remained in the book. If such mistakes are pointed out by readers, the same will be gratefully received. The author sincerely hopes that readers of the text will be benefited from approach presented and will oblige with useful suggestions.

In the last, I would like to thank all those who have been helpful directly or indirectly, in bringing the book to the present shape.

June 25, 1980

G.D. RAI

To
My Loving Children
Atul and Rachna

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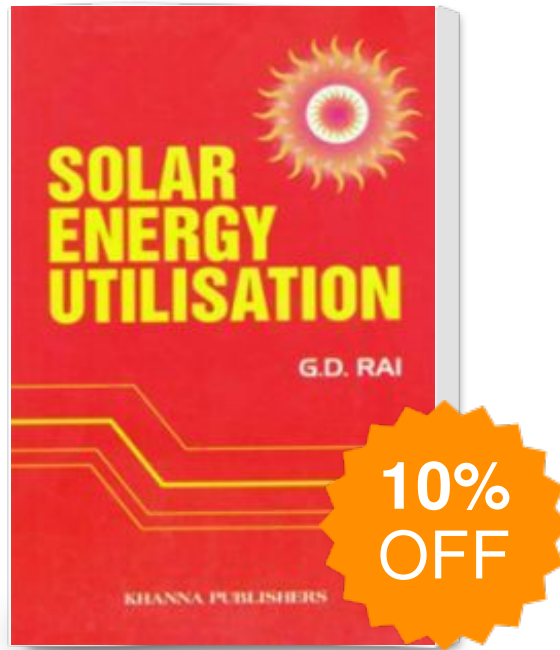
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