

**THE ENGINEER'S
EXAMINATION
MADE EASY**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649535361

The Engineer's Examination Made Easy by Robert Thomson

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

ROBERT THOMSON

**THE ENGINEER'S
EXAMINATION
MADE EASY**

THE
ENGINEER'S
EXAMINATION
MADE EASY

BY
ROBERT THOMSON.

"Read not to contradict and confute, nor to believe and take for granted, nor to find talk and discourse, but weigh and consider, or with a desire to learn which may be obtained by diligence and attention."—*Lord Bacon.*

Price Three Shillings.

ENTERED AT STATIONER'S HALL

Southampton :—
PRINTED BY PAUL & SON, 74, HIGH STREET.
1866.

186. f. 10.

PREFACE.

—oo—

THE subjects of the following pages were compiled by the Author for the assistance of three of his sons, who are following the same calling as himself, viz., the Engineering business, and to be in manuscript only. At the request of a large number of individuals for copies of this work, it is now put before the public.

The object aimed at is plainness and simplicity, with as little labour as possible. To be plain, it often follows that there are repetitions, this is considered necessary under certain circumstances. A large number of valuable works are before the public; but a large amount of the information these contain, is lost to the Practical Engineer in consequence of their Problems being solved by Algebra. The Author believes he is able to judge of the truth of this statement, having worked for more than twenty years on shore, in the erecting shops of the manufacturers of the Steam Engine in London and Glasgow—besides being more than twelve years at sea, as a sea going Engineer—

and draws the conclusion from experience that the useful knowledge of Algebra is unknown to ninety-nine out of every hundred of his class.

The Merchant Shipping Acts Amendment Act has increased the demand for some work plain and simple, with instructions for the guidance of those that may not have the advantage of a Tutor. An Engineer before he can hold the situation of 2nd Engineer at sea, (if the Ship is propelled by more than 100 nominal horse power,) has to be examined by the Board of Trade as to competency. This examination is so varied and intricate, that it requires him not only to know how to make the Steam Engine in its various shapes and forms with the strength of material, &c.; but he is also questioned as to what he would do under certain circumstances or difficulties in connection with Machinery, while perhaps the idea has not occurred to him before, and if unable to give a satisfactory answer, his certificaté may be withheld and loses the half of the fee paid for his examination. He also requires to know something about Chemistry.

To help him for this examination, the Author has written this work, beginning with simple proportion, proceeding from one rule in Arithmetic to another—often giving two examples of the same question—showing how much easier it is to work by cancelling or abbreviation, than by the multiplying and dividing by the same figures. The Author

has also devoted a large part of this work for the Viva Voce examination, and hopes that the information it contains will assist the Engineer in passing a creditable examination.

The Author acknowledges he is indebted for his information on the bursting pressure of Cylindrical Boilers, &c., from a very valuable work titled "Information for Engineers," embodying several experiments made by William Fairbairn, Esq., of Manchester; also quotations from the following works:—Hutton's Mathematics, Templeton Brunton on Mechanics, Murray on the Marine Engine, Bourne's Catechism, Jamieson's Mechanical Dictionary, Mechanics Magazine, &c.

ACT OF PARLIAMENT.

*Certificates for Engineers (PART III. of Merchant
Shipping Act, 1854.)*

Steam Ships to carry Certificated Engineers.

On and after the first day of *June*, one thousand eight hundred and sixty three, every Steam Ship which is required by the principal Act to have a Master possessing a Certificate from the Board of Trade, shall also have an Engineer or Engineers possessing a Certificate or Certificates from the Board of Trade, as follows, that is to say:—

- (1.) Engineers Certificates shall be of two grades, namely, "First-class Engineers Certificates," and "Second-class Engineers Certificates."
- (2.) Every Foreign-going Steam Ship of one hundred nominal horse-power or upwards shall have as its First and Second Engineers two Certificated Engineers, the first possessing a "First-class Engineer's Certificate," and the second possessing a "Second-class Engineer's Certificate," or a Certificate of the higher grade.
- (3.) Every Foreign-going Steam Ship of less than one hundred nominal horse-power shall have as its only or First Engineer an Engineer possessing a "Second-class Engineer's Certificate," or a Certificate of the higher grade.

- (4) Every Sea-going Home Trade Passenger Steam Ship shall have as its only or First Engineer an Engineer possessing a "Second-class Engineer's Certificate," or a Certificate of the higher grade.
- (5) Every person who, having been engaged to serve in any of the above capacities in any Steam Ship as aforesaid, goes to sea in that capacity without being at the time entitled to and possessed of such Certificate as is required by this section, and every person who employs any person in any of the above capacities in such ship without ascertaining that he is at the time entitled to and possessed of such Certificate as is required by this section, shall for each such offence incur a penalty not exceeding Fifty Pounds.

Examinations for Engineer's Certificates of Competency.

The Board of Trade shall from time to time cause Examinations to be held of Persons who may be desirous of obtaining Certificates of Competency as Engineers: For the purpose of such Examination the Board of Trade shall from time to time appoint and remove Examiners, and to award the Remuneration to be paid to them; lay down Rules as to the Qualification of Applicants, and as to the times and places of Examination; and generally do all such Acts as it thinks expedient in order to carry into effect the Examination of such Engineers as aforesaid.

Fees to be paid by Applicants for Examination.

All Applicants for Examination shall pay such Fees, not exceeding the Sums specified in the Table marked (B) in the Schedule hereto, as the Board of Trade directs;

and such Fees shall be paid to such Person as the said Board appoints for that purpose, and shall be carried to the Account of the Mercantile Marine Fund.

TABLE B.

Fees to be charged on Examination of Engineers.

| | |
|------------------------------------------------|--------|
| For a First-class Engineer's Certificate..... | £2 0 0 |
| For a Second-class Engineer's Certificate..... | 1 0 0 |

Certificates of Competency to be granted to those who pass.

The Board of Trade shall deliver to every Applicant who is duly reported to have passed the Examination satisfactorily, and to have given satisfactory evidence of his Sobriety, Experience, and Ability, a Certificate of Competency, as First-class Engineer or as Second-class Engineer as the case may be.

Engineer's Certificates of Service to be delivered on Proof of certain Service.

Certificates of Service for Engineers, differing in form from Certificates of Competency, shall be granted as follows; that is to say,

- (1) Every person who, before the first day of *April*, one thousand eight hundred and sixty-two, had served as First Engineer in any Foreign-going Steam Ship of one hundred nominal horse-power or upwards, or who has attained or attains the rank of Engineer in the service of Her Majesty or of the