

# **PROFESSIONAL ETHICS IN ENGINEERING**

**Mrs. M. Inba Arasi**  
*Head of Department – EEE Dept.*  
**Mahendra College of Engineering**  
**Salem, Tamil Nadu, INDIA.**

---

**Mr. J. Ramkumar**  
*Assistant Professor – EEE Dept.*  
**Mahendra College of Engineering**  
**Salem, Tamil Nadu, INDIA.**

---

**Mr. S. Thangapandiyan**  
*Assistant Professor – EEE Dept.*  
**Mahendra College of Engineering**  
**Salem, Tamil Nadu, INDIA.**

# PROFESSIONAL ETHICS IN ENGINEERING

Copyright © : Mrs. M. Inba Arasi  
Publishing Rights © : VSRD Academic Publishing  
*A Division of Visual Soft India Pvt. Ltd.*

**ISBN-13: 978-93-86258-50-2**

**FIRST EDITION, MAY 2017, INDIA**

*Typeset, Printed & Published by:*  
**VSRD Academic Publishing**  
*(A Division of Visual Soft India Pvt. Ltd.)*

**Disclaimer:** The author(s) are solely responsible for the contents of the papers compiled in this book. The publishers or its staff do not take any responsibility for the same in any manner. Errors, if any, are purely unintentional and readers are requested to communicate such errors to the Editors or Publishers to avoid discrepancies in future.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the Publishers & Author.

*Printed & Bound in India*

## **VSRD ACADEMIC PUBLISHING**

*A Division of Visual Soft India Pvt. Ltd.*

### **REGISTERED OFFICE**

154, Tezabmill Campus, Anwarganj, KANPUR-208003 (UP) (IN)  
Mb: 99561 27040, Web: [www.vsrdpublishing.com](http://www.vsrdpublishing.com), Email: [vsrdpublishing@gmail.com](mailto:vsrdpublishing@gmail.com)

### **MARKETING OFFICE (NORTH INDIA)**

Basement-2, Villa-10, Block-V, Charmwood Village, FARIDABAD-121009 (HY)(IN)  
Mb: 98999 36803, Web: [www.vsrdpublishing.com](http://www.vsrdpublishing.com), Email: [vsrdpublishing@gmail.com](mailto:vsrdpublishing@gmail.com)

### **MARKETING OFFICE (SOUTH INDIA)**

340, FF, Adarsh Nagar, Oshiwara, Andheri(W), MUMBAI-400053 (MH)(IN)  
Mb: 99561 27040, Web: [www.vsrdpublishing.com](http://www.vsrdpublishing.com), Email: [vsrdpublishing@gmail.com](mailto:vsrdpublishing@gmail.com)

# P R E F A C E

Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity. Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honest, impartiality, fairness and equity, and must be dedicated to the protection of the public health, safety & welfare. Engineers must perform under a standard of professional behavior which requires adherence to the highest principles of ethical conduct.

It is important for engineering students to study engineering ethics so that they will be prepared to make (sometimes difficult) ethical decisions during their professional careers. As you read this handbook, you will note that many case studies in engineering ethics do not have a single clear-cut correct answer, but may have many correct solutions, where some solutions are better than others. Therefore, ethical problems can be similar to open-ended engineering design problems, where multiple solutions exist. The purpose of this handbook is to provide students with an introduction to engineering ethics. The goals of this handbook include (1) fostering an increased awareness of ethical behavior, (2) presenting the accepted codes of ethics for professional engineering societies, and (3) presenting engineering case studies that illustrate ethical (or unethical) decisions.

The main aim of this book is to make the students to understand the concepts easily. This book makes the understanding of subject in a clear way and makes it more interesting.

 *Mrs. Inba Arasi, Mr. Ramkumar & Mr. Thangapandihyan*

# ACKNOWLEDGEMENT

We would like to express our special thanks of gratitude to our beloved chairman **Thirumigu. M.G. Bharathkumar** who gave us the golden opportunity to do this book work which helped us in doing a lot of research related undertakings.

We express our appreciation and thanks to our dynamic Managing Directors, **Er. Ba. Mahendhiran** and **Er. B. Maha Ajay Prasad** for their meticulous support extended in all aspects.


We express our profound thanks to **Dr.N.Malmurugan**, Principal, Mahendra College of Engineering, for his great enthusiasm and inspiration which enabled us to bring this venture to fruition.

We would like to express a special note of gratitude to the editing team of **VSRD Academic Publishing (A Division of Visual Soft India Private Limited)** in releasing this book.

Finally, this work would not have been possible without the love and support of **our colleagues, family members and friends**. We are extremely grateful to one and all.

 *Mrs. M. Inba Arasi*

 *Mr. J. Ramkumar*

 *Mr. S. Thangapandihyan*



**Thirumigu. M.G.BHARATHKUMAR**  
Founder & Chairman, Mahendra Educational Trust

## Forward

*"Computing in their capacity as a tool, computers will be but a ripple on the surface of our culture. In their capacity as intellectual challenge, they are without precedent in the cultural history of mankind".*

-Edsger Dijkstra, 1972 Turing Award Lecture

This book is intended to craft the students to act morally in desirable ways towards moral commitment, responsible conduct and to make them responsible towards safety of the society and to have awareness about global issues.

I am delighted to note that Faculties of Electrical and Electronics Engineering M.Inba Arasi along with J.Ramkumar and S.Thangapandiyan have written this book **"PROFESSIONAL ETHICS IN ENGINEERING"** nicely, for the benefit of student community. They have accomplished this goal, and I trust their work will encourage and enlighten all who have an interest in Professionalism in the modern world.

**M.G.BHARATHKUMAR**

Founder & Chairman, Mahendra Educational Trust

**Dedicated  
to  
Our Family, Friends & Students**

# CONTENTS

## CHAPTER 1

<b>HUMAN VALUES .....</b>	<b>1</b>
<b>1.1 MORALS .....</b>	<b>3</b>
<b>1.2 VALUES .....</b>	<b>3</b>
<b>1.3 PERSONAL ETHICS .....</b>	<b>3</b>
<b>1.4 INTEGRITY .....</b>	<b>5</b>
<b>1.5 WORK ETHICS .....</b>	<b>8</b>
<b>1.6 SERVICE LEARNING .....</b>	<b>10</b>
<b>1.7 CIVIC VIRTUE .....</b>	<b>12</b>
<b>1.9 LIVING PEACEFULLY .....</b>	<b>16</b>
<b>1.10 CARING .....</b>	<b>18</b>
<b>1.11 SHARING .....</b>	<b>18</b>
<b>1.12 HONESTY .....</b>	<b>19</b>
<b>1.13 COURAGE .....</b>	<b>21</b>
<b>1.14 VALUING TIME .....</b>	<b>22</b>
<b>1.15 COOPERATION .....</b>	<b>22</b>
<b>1.16 COMMITMENT .....</b>	<b>23</b>
<b>1.17 EMPATHY .....</b>	<b>24</b>
<b>1.18 SELF-CONFIDENCE .....</b>	<b>25</b>
<b>1.19 CHALLENGES IN THE WORK PLACE .....</b>	<b>26</b>
<b>1.20 SPIRITUALITY .....</b>	<b>33</b>

## CHAPTER 2

<b>ENGINEERING ETHICS .....</b>	<b>37</b>
<b>2.1 SENSES OF ENGINEERING ETHICS .....</b>	<b>39</b>
<b>2.2 VARIETY OF MORAL ISSUES .....</b>	<b>39</b>
<b>2.3 TYPES OF INQUIRIES .....</b>	<b>41</b>
<b>2.4 MORAL DILEMMA .....</b>	<b>43</b>
<b>2.5 MORAL AUTONOMY .....</b>	<b>45</b>
<b>2.6 MORAL DEVELOPMENT (THEORIES) .....</b>	<b>47</b>

2.7	CHARACTERISTICS OF PROFESSION .....	49
2.8	MODELS OF PROFESSIONAL ROLES .....	51
2.9	RESPONSIBILITY .....	53
2.10	THEORIES ABOUT RIGHT ACTION (ETHICAL THEORIES).....	60
2.11	SELF-CONTROL .....	69
2.12	SELF-INTEREST.....	69
2.13	CUSTOMS.....	70
2.14	RELIGION .....	72
2.15	SELF-RESPECT .....	73

## **CHAPTER 3**

### **ENGINEERING AS SOCIAL EXPERIMENTATION..... 77**

3.1	ENGINEERING AS EXPERIMENTATION .....	79
3.2	ENGINEERS AS RESPONSIBLE EXPERIMENTERS.....	85
3.3	CODES OF ETHICS .....	88
3.4	INDUSTRIAL STANDARDS .....	91
3.5	A BALANCED OUTLOOK ON LAW.....	92
3.6	CASE STUDY: THE CHALLENGER.....	94

## **CHAPTER 4**

### **SAFETY, RESPONSIBILITIES AND RIGHTS .....101**

4.1	SAFETY AND RISK .....	103
4.2	RISK ANALYSIS .....	104
4.3	ASSESSMENT OF SAFETY AND RISK .....	107
4.4	RISK BENEFIT ANALYSIS.....	113
4.5	PUBLIC RISK AND PUBLIC ACCEPTANCE .....	114
4.6	ACCOUNTING PUBLICLY FOR BENEFITS AND RISKS.....	116
4.7	COLLEAGIALITY & ITS ELEMENTS.....	119
4.8	CLASSIFICATIONS OF LOYALTY .....	120
4.9	AUTHORITY .....	121
4.10	PUBLIC SERVICE ARGUMENT- COLLECTIVE BARGAINING.....	124
4.11	CONFIDENTIALITY .....	127
4.12	CONFLICT OF INTEREST .....	128



4.13	TYPES OF CRIME .....	131
4.14	TYPES OF RIGHTS.....	132
4.15	WHISTLE-BLOWING AND ITS FEATURES.....	136
4.16	EMPLOYEE RIGHTS .....	139
4.17	DISCRIMINATION .....	140
4.18	INTELLECTUAL PROPERTY RIGHTS .....	140

## **CHAPTER 5**

<b>GLOBAL ISSUES.....</b>		<b>145</b>
<b>5.1</b>	<b>MULTINATIONAL CORPORATIONS .....</b>	<b>147</b>
<b>5.2</b>	<b>ENVIRONMENTAL ETHICS.....</b>	<b>156</b>
<b>5.3</b>	<b>COMPUTER ETHICS.....</b>	<b>163</b>
<b>5.4</b>	<b>WEAPONS DEVELOPMENT .....</b>	<b>173</b>
<b>5.5</b>	<b>ENGINEERS AS MANAGERS .....</b>	<b>175</b>
<b>5.6</b>	<b>CONSULTING ENGINEERS .....</b>	<b>177</b>
<b>5.7</b>	<b>ENGINEERS AS EXPERT WITNESS .....</b>	<b>180</b>
<b>5.8</b>	<b>ENGINEERS AS ADVISORS IN PLANNING AND POLICY MAKING .....</b>	<b>182</b>
<b>5.9</b>	<b>MORAL LEADERSHIP.....</b>	<b>185</b>
<b>5.10</b>	<b>CODES OF ETHICS .....</b>	<b>187</b>
<b>5.11</b>	<b>ENGINEERING COUNCIL OF INDIA .....</b>	<b>205</b>
<b>5.12</b>	<b>CODES OF ETHICS FOR TATA GROUP .....</b>	<b>205</b>
<b>5.13</b>	<b>ETHICS AND CODES OF BUSINESS CONDUCT IN MNC .....</b>	<b>206</b>

