
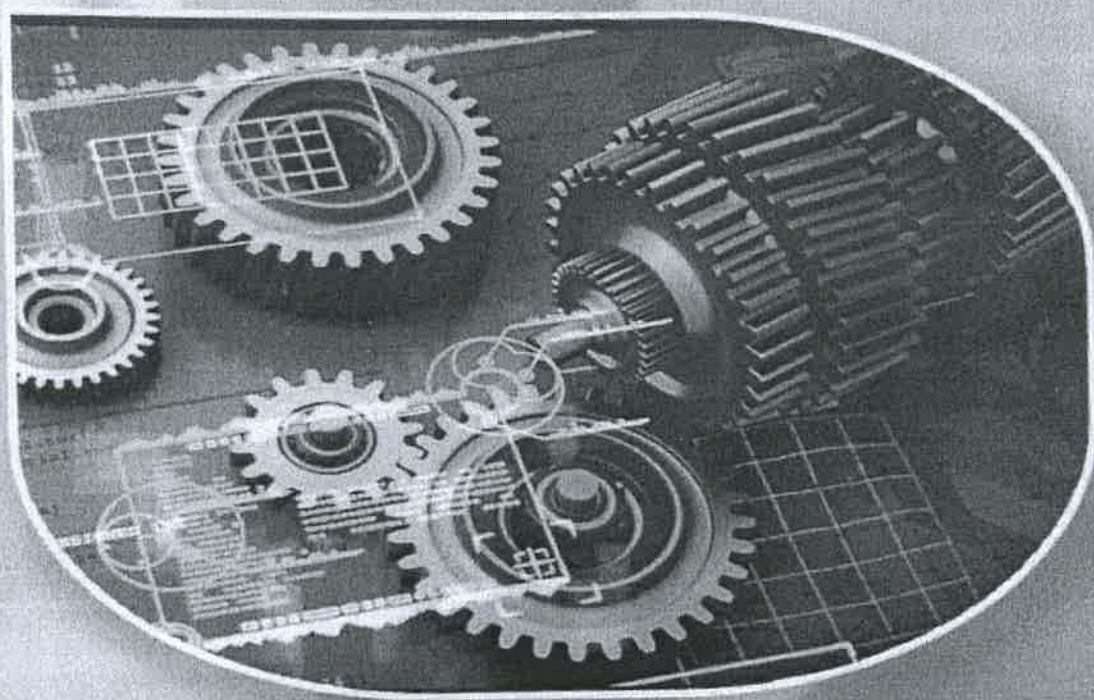


3.2.2 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during the year

Sr. No	Name of the teacher	Title of the book/chapters published	Title of the paper	Year of publication	ISBN number of the proceeding	Affiliating Institute at the time of publication	Name of the publisher
1	Dr. Harish Harsurkar	Engineering Mechanics	Engineering Mechanics	2024	978-93-6132-709-4	SPPU	Scientific International Publishing House
2	Prof. Husain Shaikh	Engineering Mechanics	Engineering Mechanics	2024	978-93-6132-709-4	SPPU	Scientific International Publishing House
3	Prof. Tanuja Hulavale	Engineering Mechanics	Engineering Mechanics	2024	978-93-6132-709-4	SPPU	Scientific International Publishing House
4	Prof. Poonam Phopalkar	Engineering Mechanics	Engineering Mechanics	2024	978-93-6132-709-4	SPPU	Scientific International Publishing House


PRINCIPAL
VPS College of Engineering & Technology
Lonavala

ENGINEERING MECHANICS



Dr. Harish Harsurkar
Prof. Husain Shaikh
Prof. Tanuja S. Hulavale
Prof. Poonam Arvind Pophalkar



PRINCIPAL
VPS College of Engineering & Technology
Lonavala



AnyScanner

Author's Profile



Dr. Harish Harsurkar is currently working as HOD, in Department of Mechanical Engineering in Vidya Prasarini Sabha's College of Engineering and Technology, Lonavala. He received B.E (Mechanical Engineering) from Basavakalyan engineering college Basavakalyan, Karnataka in 2011. He received M.Tech (Machine Design) degree from Maratha Mandal Engineering College, Belagavi, Karnataka in 2015 and PhD from Sri Satya Sai University of technology and medical science sehare MP, India in 2021. His research interests include Design of Machine Elements, Fundamentals of Machine Components Design. He attended many National Conferences and International Conferences. He has published more than 25 National and International Journal papers. He has published one E book on Airless Tyres. He has filed one Indian patent.




Prof. Husain Shaikh is currently working as Assistant Professor Department of Mechanical Engineering in Vidya Prasarini Sabha's College of Engineering and Technology, Lonavala. He received B.E (Mechanical Engineering) degree from Savitribai Phule Pune University, in 2013, M.E (Design Engineering) in 2017 degree from Savitribai Phule Pune University, in 2013 and PhD (Pursuing) Mahakaushal University, Madhya Pradesh from India from 2022. He has published one E book on Airless Tyres. He has both academic and administration experience in Engineering Field since from 2015 June to till date. His research interests include Design of Machine Elements, Fundamentals of Machine Components Design. He attended many National Conferences and International Conferences. He has published more than 10 National and International Journal papers. He has filed one Indian patent



Prof. Tanuja S. Hulavale is currently working as Assistant Professor, Department of Mechanical Engineering in Vidya Prasarini Sabha's College of Engineering and Technology, Lonavala. She received her B.E (Mechanical Engineering) degree from Savitribai Phule Pune University, Maharashtra in 2014 and M.Tech (Machine Design) degree from Sri Satya Sai University of technology and medical science Sehare MP, India in 2023. She has both academic and administration experience in Engineering Field. She is Departmental Engineering Students & Staff Association (MESA) Faculty Coordinator. Her research interests include Machine Components Design and their Fundamentals, Mechanical Design Softwares. She has very good technical explore on both Catia and AutoCad, SolidWorks, Ansys Design Softwares with respect to Machine Design. She attended many National Conferences and International Conferences.



Prof. Poonam Arvind Pophalkar is currently working as Assistant Professor, Department of Civil Engineering in Vidya Prasarini Sabha's college of Engineering and Technology, Waksai Lonavala. She received her B.E degree in Civil Engineering from Sant Gadge Baba Amravati University, Amravati in 2015, and M.E. degree in Structural Engineering from Pankaj Laddhad Institute of Technology and Management Studies Buldana, Sant Gadge Baba Amravati university, Amravati in 2017, India respectively. She has both academic and administration experience in Engineering Field. She has Departmental ISTE, IEI coordinator, Civil Engineering Students & Staff Association (CESA) Faculty Coordinator. Her research interests include Implication of Major International Codal Design Provision for Open Ground Storey Building. She has very good technical explore on AutoCAD, STAAD-Pro, ETAB also.

 Scientific International
Publishing House




PRINCIPAL
VPS College of Engineering & Technology
Lonavala



AnyScanner

Engineering Mechanics

FIRST EDITION

AUTHORS

**Dr. Harish Harsurkar,
Prof. Husain Shaikh,
Prof. Tanuja S. Hulavale,
Prof. Poonam Arvind Pophalkar.**



(SCIENTIFIC INTERNATIONAL PUBLISHING HOUSE)

A handwritten signature in green ink, appearing to be 'VPS', is written above the text.

PRINCIPAL
VPS College of Engineering & Technology
Lonavala



AnyScanner

Title of the Book : Engineering Mechanics.
Edition: First - 2024.
Copyrights © Authors.

No part of this text book may be reproduced or transmitted in any form by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the copyright owners.

Disclaimer

The authors are solely responsible for the contents published in this text book. The publishers or editors 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.

ISBN: 978-93-6132-709-4

MRP: ₹ 600

PUBLISHER & PRINTER: Scientific International Publishing House

Contact: +917019991025

Website: www.slinternationalpublishers.com



PRINCIPAL

VPS College of Engineering & Technology AnyScanner

Lonavala

This book is dedicated to my Daughter (HariPriya Harsurkar), whose support for my research and writing has been quite phenomenal and special thanks to my parents.

Dr. Harish Harsurkar

This book is dedicated to my parents, my Wife and my Kids (Zain & Hamza), whose support for my research and writing has been quite phenomenal.

Mr. Husain Shaikh

This book is dedicated to my parents, family members and my departmental colleagues, whose support for my research and writing has been quite phenomenal and special thanks to my sister (Ms. Dhanashree Hulavale).

Ms. Tanuja S. Hulavale

This book is dedicated to my parents, family members, my teachers and my colleagues, whose support for my research and writing has been quite phenomenal.

Ms. Poonam A. Pophalkar



PRINCIPAL
VPS College of Engineering & Technology
Lonavala



Table of Contents

Chapter No.	Contents	Page No.
I	1. FUNDAMENTALS OF ENGINEERING MECHANICS	
	1.1. Fundamentals	1
	1.2. Divisions of Engineering Mechanics	1
	1.3. Mass and Weight	3
	1.4. Scalar and Vector	4
	1.5. System of Forces	5
	1.6. Free body diagram	8
	1.7. Resolution of a force	11
	1.8. Determination of resolved parts of a force	13
	1.9. Methods for finding the resultant force	15
	1.10. Graphical method triangle law of forces	26
	1.11. Polygon law of forces	27
	1.12. Graphical method for the resultant of parallel forces	35
	1.13. Moment of a force	36
	1.14. Types of moments	37
	1.15. Principle of moments	42
	1.16. Couple	47
II	2. STRESS AND STRAIN	50
	2.1. Classification of Engineering Materials	50
	2.2. Mechanical Properties	51
	2.3. Types of Stresses	55
	2.4. Types of Strain	57
	III	
	3. FRICTION	
	3.1. Frictional force	79
	3.2. Limiting friction	80
	3.3. Laws of friction	82
	3.4. Equilibrium of bodies on level plane	83
	3.5. Equilibrium of a body on a rough inclined plane	84
	3.6. Applications of friction	96
	4. CENTROID AND MOMENT OF INERTIA	105
	4.1. Centroid introduction	105
	4.2. Centre of gravity by moments	106
	4.3. Centre of gravity of plane figures	107
	4.4. Centroid of various cross sections	110
	4.5. Centroids of solid bodies	112
	4.6. Centre of gravity of symmetrical sections	113
	4.7. Centre of gravity of unsymmetrical sections	116
	4.8. Moment of inertia	118
	4.9. Moment of inertia of some geometric shapes	128
	5. SIMPLE MACHINES	131
	5.1. Introduction	131
	5.2. Simple gear train	132
	5.3. Compound gear train	134
	V	
	2.5. Equilibrium of Forces	64
	2.6. Types of equilibrium	66
	2.7. Lami's Theorem	68

5.4. Terminology in simple lifting machine

135

5.5. Reversible machine

138

5.6. Study of simple machines

140

5.7. Hoisting Machine

145

6. Dynamics

156

6.1. Kinematics and Kinetics

156

6.2. Principles of Dynamics

156

6.3. D'Alembert's Principle

158

6.4. Momentum and Impulse

162

6.5. Law of Conservation of Energy

163

6.6. Collision of elastic bodies

164

Assessment Questions

176

References

210

CHAPTER I

FUNDAMENTALS OF ENGINEERING MECHANICS

1.1. Fundamentals

Engineering Mechanics

Mechanics is that branch of physical science which deals with the action of forces on material bodies. Engineering Mechanics, which is very often referred to as Applied Mechanics, deals with the practical applications of mechanics in the field of engineering. Applications of Engineering Mechanics are found in analysis of forces in the components of roof truss, bridge truss, machine parts, parts of heat engines, rocket engineering, aircraft design etc.

1.2. Divisions of Engineering Mechanics

The subject of Engineering Mechanics may be divided into the following two main groups:

1. Statics and 2. Dynamics.

Statics

It is the branch of Engineering Mechanics, which deals with the forces and their effects, while acting upon the bodies at rest.

Dynamics

It is the branch of Engineering Mechanics, which deals with the forces and their effects, while acting upon the bodies in motion. Dynamics may be further subdivided into the following two branches:

1. Kinematics
2. Kinetics