

Engineering Mechanics Lab Manual

Dr. A. K. Gupta
Mohit Bhoot



Engineering Mechanics Lab Manual

Dr. A.K. Gupta

Professor,
Structural Engineering Department,
M B M Engineering College, J N V University,
Jodhpur (Raj)

Mohit Bhoot

Assistant Engineer (Civil),
Public Health Sanitary Sub-Division,
GWSSB, Deesa (Guj.)



Published by:

Scientific Publishers (India)
5 A, New Pali Road, P.O. Box 91
Jodhpur 342 001 (India)

E-mail: info@scientificpub.com
Website: www.scientificpub.com

Branch Office
Scientific Publishers (India)
4806/24, Ansari Road, Daryaganj
New Delhi - 110 002 (India)

© 2015, Gupta & Bhoot

All rights reserved. No part of this publication or the information contained herein may be reproduced, adapted, abridged, translated, stored in a retrieval system, computer system, photographic or other systems or transmitted in any form or by any means, electronic, mechanical, by photocopying, recording or otherwise, without written prior permission from the authors.

Disclaimer: Whereas every effort has been made to avoid errors and omissions, this publication is being sold on the understanding that neither the editors (or authors) nor the publishers nor the printers would be liable in any manner to any person either for an error or for an omission in this publication, or for any action to be taken on the basis of this work. Any inadvertent discrepancy noted may be brought to the attention of the publishers, for rectifying it in future editions, if published.

ISBN: 978-81-7233-930-2

eISBN: 978-93-86102-33-1

Printed in India

Preface

Knowledge can be defined as familiarity with something, which can include some facts, information about a particular topic or subject, descriptions of experiments or study. It has been broadly classified into two types viz. Theoretical & Practical.

We cannot think of one being inferior to the other as both go hand in hand or side by side. 'Temples' of learning the theoretical aspects of knowledge about any discipline are the classrooms & the lecture theatres while for the practical aspects, there are the laboratories. To catch up with the advances in the technology one must be well acquainted with the basic know how of the things. For the very same purpose this manual has been written.

Engineering Mechanics is a very crucial subject for almost all disciplines of engineering & sciences. The subject deals with the basic laws & fundamentals of the mechanics we encounter in our day to day, be it lever problem, phenomena related to friction, weight lifting machines, systems of pulleys & others.

The manual has been prepared in the form of a 'complete package' that includes, experiments which have been written very carefully meeting the standard adopted procedures, descriptive figures that aid the understanding, discussion section that intrigues the analytical & rational thinking, objective questions section & a wide reference list for detailed study. The language has been used keeping in view the wide readership which includes students, demonstrators, lecturers, field personnel & others. The selection of the experiments has been done very precisely, incorporating the very important ones from the subject.

Though ample efforts have been made to produce the manual with minimum flaws but they may have still crept in. We would be very gracious to the readers who would bring to our notice the errors in the text.

Last but not the least, we are also very thankful to Scientific Publishers for taking keen interest in the work & extending their support in bring out the manual in its present form.

Authors

Contents

1.	To verify the Law of Parallelogram of forces & the Lami's Theorem.	1
2.	To verify the Polygon law of forces.	6
3.	To determine the forces in the members of a Jib Crane.	9
4.	To determine the Reactions at the supports of a Simply Supported Beam.	13
5.	To determine the Coefficient of Friction between two surfaces on a horizontal plane.	16
6.	To determine the Coefficient of Friction between two surfaces on an inclined plane.	19
7.	To verify the Principle of Moments using Bell Crank Lever.	22
8.	To verify the Principle of Moments using Compound Lever.	26
9.	To determine the Mechanical Advantage, Velocity Ratio & Efficiency of First System of Pulleys.	30
10.	To determine the Mechanical Advantage, Velocity Ratio & Efficiency of Second System of Pulleys.	34
11.	To determine the Mechanical Advantage, Velocity Ratio & Efficiency of Third System of Pulleys.	38
12.	To determine the Mechanical Advantage, Velocity Ratio, Efficiency & Law of Machine for the Weston's Pulley Block.	42
13.	To determine the Mechanical Advantage, Velocity Ratio, Efficiency & Law of Machine for a Worm & Worm Wheel.	47
14.	To determine the Mechanical Advantage, Velocity Ratio & Efficiency of a Differential Wheel & Axle.	51
15.	To determine the Mechanical Advantage, Velocity Ratio, Efficiency & Law of Machine for a Screw Jack.	55

16.	To determine the Mechanical Advantage, Velocity Ratio & Efficiency of a Single Purchase Crab Winch.	59
17.	To determine the Mechanical Advantage, Velocity Ratio, Efficiency & Law of Machine for a Double Purchase Crab Winch.	63
18.	To determine the Mass Moment of Inertia of a Flywheel.	68
	Multiple Choice Questions	72
	Answersheet	85
	Suggested books	86