

## Preface (New Revised Edition)

The scheme "Centers of Excellence" introduced by DGET initially in a few selected ITI's in the country, is now in operation in over 500 ITI's. Substantial financial support has been provided through domestic and World Bank funding for upgradation of infrastructure and facilities in these privileged ITI's. All this has been done in view of changed industrial requirements and skilling people accordingly.

We had brought out the first edition of this book to meet the needs of trainees and instructors engaged in the sector of Production and Manufacturing. As the book covered well the entire syllabus of the six modules under the theory subject and further because of its unique feature of combining Theory and Assignment in one volume, the book was extremely well received by our esteemed users. At the same time we received some useful suggestions too. In view of this and on our own assessment, we revised the first edition making significant additions in most of the chapters on Theory and also adding many new test items in the Assignment part of the book. While doing so, we also took note of the test items which appeared in the final trade tests held so far.

In this Fifth Edition, we have added a new chapter namely "Miscellaneous Practice Questions" which comprises an assortment of important questions covering all the modules. The purpose is that the trainees should be able to practice and do self-evaluation of their understanding of the subject. This should hopefully, make them identify their strong and weak points and prepare themselves well for taking the final trade test with confidence.

We will continue, as has been the case so far, to bring out every subsequent edition with valuable additions and modifications. In this endeavour, we shall always be looking forward to valuable suggestions from our readers and users of this volume.

— Authors

## Preface (First Edition)

In its endeavor to improve the quality of craftsmen training in the Industrial Training Institutes (ITIs), Directorate General of Employment and Training (DGET), under the Ministry of Labour, Government of India, has introduced the scheme "Centres of Excellence" in selected ITIs in the country. The core objective of the scheme is to produce multi-skilled workforce of world standard. Under this scheme, the first year of training comprises of broad-based basic training. This is then followed by advanced courses on modular basis. The various sectors chosen for training include Production & Manufacturing, Electrical, Electronics, Automobile, Hospitality, Apparel, Chemical, Information Technology, Leather Goods & Footwear, Instrumentation, Refrigeration & Air Conditioning.

This book has been written in accordance with the syllabus for the first year broad-based training in the sector of Production & Manufacturing, and this is the sector selected for training in the maximum number of ITIs.

Manufacturing involves a complex system of men, machines, materials, methods and management techniques. The sole objective is to produce goods at economical cost. At the core of manufacturing is the technology of transformation of inputs into output. The manufacturing technology is constantly undergoing change, today's mantra being, Faster, Better and Cheaper. With this being the need of the day, the skills that the craftsmen are required to possess have become more demanding. Gone are the days when acquiring a single set of narrow skills would suffice for one to continue with during the whole of normal working life. What is required today is for the craftsmen to be proficient in a range of related skills and it is here that the concept of "multi-skill" has assumed due importance.

Thus a craftsman mainly engaged in a mechanical workshop should also be well acquainted with the basics of electricity, electronics etc. Computers have entered every field of activity and therefore, the use of computers is something which everyone must know. Keeping all this in view, DGET has designed syllabus for preparing skilled workers for the mechanical manufacturing industry. The syllabus (and hence the contents of this book) has been divided into following modules :

- Module 1 :** Basic Fitting and Measurement
- Module 2 :** Basic Sheet Metal Worker and Welding
- Module 3 :** Basic Electrical, Electronics and Computer Skill
- Module 4 :** Basic Turning and Grinding (including knowledge of Material and Heat Treatment)
- Module 5 :** Basic Milling and Gear Cutting (including knowledge of Planing, Shaping and Slotting)
- Module 6 :** Basic CNC Programming & Operation and Hydraulics & Pneumatics

The matter in this book has been divided into two parts: Part I covers trade theory aspects with adequate clarity in text and graphics but without unnecessary lengthy details. Part II, the unique feature of this book is a compilation of test items in three most widely used styles i.e., short answer type, multiple choice and matching type. This compilation is meant to enable students to gauge their level of learning, on the one hand and prepare for the final trade test, on the other. Each of the two parts of this book are split into six modules, as per the syllabus, and further split into appropriate chapters.

The authors who have decades of experience in the field of vocational training and have written many books in this field, sincerely hope that instructors and students will find this book extremely useful. Suggestions for improvement are desirable and will be most welcome from the readers. This will enable the authors to further improve the contents of the book and serve the needs of instructors and students

— Authors

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