Nptel Syllabus Metrology

Since the publication of the first edition of Integrated Product and Process Design and Development: The Product Realization Process more than a decade ago, the product realization process has undergone a number of significant changes. Reflecting these advances, this second edition presents a thorough treatment of the modern tools used in the integrated product realization process and places the product realization process in its new context. See what's new in the Second Edition: Bio-inspired concept generation and TRIZ Computing manufacturing cost, costs of ownership, and life-cycle costs of products Engineered plastics, ceramics, composites, and smart materials Role of innovation New manufacturing methods: in-mold assembly and layered manufacturing This book discusses how to translate customer needs into product requirements and specifications. It then provides methods to determine a product's total costs, including cost of ownership, and covers how to generate and evaluate product concepts. The authors examine methods for turning product concepts into actual products by considering development steps such as materials and manufacturing processes selection, assembly methods, environmental aspects, reliability, and aesthetics, to name a few. They also introduce the design of experiments and the six sigma philosophy as means of attaining quality. To be globally viable, corporations need to produce innovative, visually appealing, quality products within shorter development times. Filled with checklists, guidelines, strategies, and examples, this book provides proven methods for creating competitively priced quality products.

This monograph and translation from the Russian describes in detail and comments on the fundamentals of metrology. The basic concepts of metrology, the principles of the International System of Units SI, the theory of measurement uncertainty, the new methodology of estimation of measurement accuracy on the basis of the uncertainty concept, as well as the methods for processing measurement results and estimating their uncertainty are discussed from the modern position. It is shown that the uncertainty concept is compatible with the classical theory of accuracy. The theory of random uncertainties is supplemented with their most general description on the basis of generalized normal distribution; the instrumental systematic errors are presented in connection with the methodology of normalization of the metrological characteristics of measuring instruments. The information about modern systems of traceability is given. All discussed theoretical principles and calculation methods are illustrated with examples.

Market_Desc: Primary MarketMechanical Engineering students. UG students of the allied disciplines like Manufacturing Engineering, Production Engineering, Industrial Engineering, Aero. Engg, Automobile Engg, Manuf. Sc. & Engg. Students in PG and Dual Degree.Secondary MarketStudents and young professionals trying for AMIE certificate from the Institution of Engineers where also machining and machine tools is a compulsory subject for the Mechanical Engineering stream. The candidates preparing for the competitive examinations like IES, IRSE, IFS, etc. will also be benefited by this book. Special Features: · Comprehensive coverage from basic to advanced topics· Lucid and simple-to-understand style of explanation· Key concepts are driven home with apt examples and solved problems· Visual recall is enhanced by the clear artwork accompanying all the concepts· Solved and unsolved problems are included to inculcate problem-solving abilities in the reader· This book has been pedagogically enriched with: ü 600 line diagrams and photographs of all types of machine tools and instruments used in manufacturing processesü 100+ solved problems and examplesü 120+ unsolved problemsü 430+ objective type questions, with special focus on competitive examsü Nearly 600 review questions (long and short answer) covering all topics for university examsCD Companion:· Answers to multiple-choice questions· Chapters wise References· Bibliography · Two Model Question Papers About The Book: Machining and machine tools is a text targeted towards the students and teachers for the undergraduate Manufacturing Processes course in the Mechanical Engineering discipline. Post graduate students in the production and manufacturing streams will also find this book a good reference.This book brings a holistic approach to the understanding of machine tools and manufacturing processes, giving equal emphasis to historical background and chronological development, and to modern developments in manufacturing and contemporary machining processes. With the help of lucid explanations coupled with striking examples and accompanying visual aids, the book begins from the very basics and gradually builds reader understanding up to the advanced topics in this field.This is also a handy text for practising professionals as it contains all the relevant tables, data and figures, and can act as a quick reference.

Nondestructive Testing Techniques

Engineering Metrology and Measurements

Mechanical Measurements

Fundamentals and Applications

Environmental Geomechanics

Ground Improvement Techniques (PB)

For the experienced manufacturing professional, the book offers a review of inspection and measurement concepts, and some new insights into the subject. For those new to inspection and measurement, the text will help them grasp the technology involved and the methods for effectively planning applications.

In recent years the increased awareness of environmental issues has led to the development of new approaches to product design, known as Design for Environment and Life Cycle Design. Although still considered emerging and in some cases radical, their principles will become, by necessity, the wave of the future in design. A thorough exploration of the subject, Product Design for the Environment: A Life Cycle Approach presents key concepts, basic design frameworks and techniques, and practical applications. It identifies effective methods and tools for product design, stressing the environmental performance of products over their whole life cycle. After introducing the concepts of Sustainable Development, the authors discuss Industrial Ecology and Design for Environment as defined in the literature. They present the life cycle theory and approach, explore how to apply it, and define its main techniques. The book then covers the main premises of product design and development, delineating how to effectively integrate environmental aspects in modern product design. The authors pay particular attention to environmental strategies that can aid the achievement of the requisites of eco-efficiency in various phases of the product life cycle. They go on to explore how these strategies are closely related to the functional performance of the product and its components, and, therefore, to some aspects of conventional engineering design. The book also introduces phenomena of performance deterioration, together with principles of design for component durability, and methods for the assessment of residual life. Finally, the book defines entirely new methods and tools in relation to strategic issues of Life Cycle Design. Each theme provides an introduction to the problems and original proposals based on the authors' experience. The authors then discuss the implementation of these new concepts in design practice, differentiating between levels of intervention and demonstrating their use and effectiveness in specific case studies. The book not only presents evidence of the potential of the approach and methods proposed, but also analyzes some of the problems involved in developing eco-compatible products in the company context.

Compiling strategies from more than 30 years of experience, this book provides numerous case studies that illustrate the implementation of noise control applications, as well as solutions to common dilemmas encountered in noise reduction processes. It offers methods for predicting the noise generation level of common systems such as fans, motors, c

Nonlinear Phenomena in Power Electronics

The Finite Element Method in Engineering

INTRODUCTION TO HYDRAULICS AND PNEUMATICS

MACHINING AND MACHINE TOOLS (With CD)

Industrial Noise Control and Acoustics

Based upon several years of extensive research performed at U.S. government laboratories, this reference offers a wide range of techniques involving flaw detection, the testing of properties and the integrity of materials in a way which does not impart damage or impair the usefulness of the material. Covers visual, penetration, sonic, ultrasonic, magnetic, electromagnetic, penetrant and enhanced visual inspections as well as combined applications of these methods. Provides guidelines to select appropriate testing techniques and equipment.

Manufacturing, reduced to its simplest form, involves the sequencing of product forms through a number of different processes. Each individual step, known as an unit manufacturing process, can be viewed as the fundamental building block of a nation's manufacturing capability. A committee of the National Research Council has prepared a report to help define national priorities for research in unit processes. It contains an organizing framework for unit process families, criteria for determining the criticality of a process or manufacturing technology, examples of research opportunities, and a prioritized list of enabling technologies that can lead to the manufacture of products of superior quality at competitive costs. The study was performed under the sponsorship of the National Science Foundation and the Defense Department's Manufacturing Technology Program.

Composite Materials and Processing provides the science and technology of processing several composites using different processing methods, and includes collective information on the processing of common and advanced composite materials. It also weighs the advantages and disadvantages of various processing methods. This book is suitable for materia

Product Design and Development

The Product Realization Process, Second Edition

Inspection and Measurement in Manufacturing

Rapid Manufacturing

The Design of Optical Systems

Product Design for the Environment

Modelling and analysis of dynamical systems is a widespread practice as it is important for engineers to know how a given physical or engineering system will behave under specific circumstances. This text provides a comprehensive and systematic introduction to the methods and techniques used for translating physical problems into mathematical language, focusing on both linear and nonlinear systems. Highly practical in its approach, with solved examples, summaries, and sets of problems for each chapter, Dynamics for Engineers covers all aspects of the modelling and analysis of dynamical systems. Key features: Introduces the Newtonian, Lagrangian, Hamiltonian, and Bond Graph methodologies, and illustrates how these can be effectively used for obtaining differential equations for a wide variety of mechanical, electrical, and electromechanical systems. Develops a geometric understanding of the dynamics of physical systems by introducing the state space, and the character of the vector field around equilibrium points. Sets out features of the dynamics of nonlinear systems, such as like limit cycles, high-period orbits, and chaotic orbits. Establishes methodologies for formulating discrete-time models, and for developing dynamics in discrete state space. Senior undergraduate and graduate students in electrical, mechanical, civil, aeronautical and allied branches of engineering will find this book a valuable resource, as will lecturers in system modelling, analysis, control and design. This text will also be useful for students and engineers in the field of mechatronics.

p="" This book focuses both on the basics and more complex topics in mechanical measurements such as measurement errors & statistical analysis of data, regression analysis, heat flux, measurement of pressure, and radiation properties of surfaces. End of chapter problems, solved illustrations, and exercise problems are presented throughout the book to augment learning. It is a useful reference for students in both undergraduate and postgraduate programs. ^

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Green Manufacturing

Unit Manufacturing Processes

Instructor's Solutions Manual for Electronic Instrumentation and Measurements

(in S.I. Units)

THEORY OF ELASTICITY AND PLASTICITY

Nondestructive evaluation and quality control

Introduction to Micromachining discusses the working principles, the laboratory models developed and the applications of different individual micromachining processes. It basically deals with two classes of u-machining processes: First category deals with those processes used for shaping and sizing of microproducts and macroproducts, for example, electrochemical micromachining, electrodischarge micromachining, laser beam micromachining, diamond turning etc. The second class of u-machining processes includes u-/ nano-finishing techniques useful for both u and macro products. These processes include abrasive flow machining, magnetic abrasive finishing, magnetic float polishing, etc. This book is an outcome of joint efforts by a group of Professors and Researchers from the renowned institutions from different countries, involved in high level research in related areas. They have written chapters in this book useful for the undergraduate and postgraduate students as a text book, and as a reference book for those involved in the research work in u-machining area.NEW TO THE SECOND EDITION: Eight new chapters Review questions to help both the teachers and students Solved problems, objective questions, multiple choice questions and short questions These facets of the second edition of the book make it a suitable textbook.

This introductory textbook is designed for undergraduate courses in Hydraulics and Pneumatics/Fluid Power/Oil Hydraulics taught in Mechanical, Industrial and Mechatronics branches of Engineering disciplines. Besides focusing on the fundamentals, the book is a basic, practical guide that reflects field practices in design, operation and maintenance of fluid power systems—making it a useful reference for practising engineers specializing in the area of fluid power technology. With the trends in industrial production, fluid power components have also undergone modifications in designs. To keep up with these changes, additional information and materials on proportional solenoids have been included in the second edition. It also updates drawings/circuits in the pneumatic section. Besides, the second edition includes a CD-ROM that acquaints the readers with the engineering specifications of several pumps and valves being manufactured by industry. KEY FEATURES : • Gives step-by-step methods of designing hydraulic and pneumatic circuits. • Provides simple and logical explanation of programmable logic controllers used in hydraulic and pneumatic circuits. • Explains applications of hydraulic circuits in machine tool industry. • Elaborates on practical problems in a chapter on troubleshooting. • Chapter-end review questions help students understand the fundamental principles and practical techniques for obtaining solutions.

Rapid prototyping is an exciting new technology used to create physical models and functional prototypes directly from CAD models. Rapid tooling concerns the production of tooling using parts manufactured by rapid prototyping. The book describes the characteristics and capabilities of the main known rapid prototyping processes. It covers in detail various commercially available processes such as: Stereolithography (SLA), Selective Laser Sintering (SLS), and others. The text places a strong emphasis on practical applications and contains an abundance of photographs and diagrams to illustrate clearly the principles of the machines and processes involved.

Introduction to Micromachining

Ionospheric Data; CRPL-F-A 172

A Life Cycle Approach

Integrated Product and Process Design and Development

Dynamics for Engineers

A Textbook of Strength of Materials

Brings the knowledge of 24 experts in this maturing field out from the narrow confines of academic circles, and makes it accessible to graduate students and power electronics professionals alike. * Provides practicing engineers with the knowledge to predict power requirement behavior. * The insights gained from this all-inclusive compilation will ultimately lead to better design methodologies.

Using a distinctive blend of theory-based explanations and real-world applications, Fundamentals of Instrumentation, 2E will guide users through the basics of instrumentation - from installation to wiring, process connections, and calibration. The updated edition has improved readability and six new chapters covering the most critical topics in the industry such as loop checking, loop turning, troubleshooting, testing techniques, and more. This excellent learning tool can be used by anyone entering the field, or by a seasoned professional as a valuable reference on-the job. With the help of the book's detailed illustrations, diagrams, and practical examples; users will gain proficiency in mounting, wiring, impulse tubing, and the calibration principles of instrumentation. Benefits: * sidebars featuring safety and technical tips provide a context for applying information in real-world scenarios as it is learned * practical chapter objectives set the stage for information about to be covered, allowing users to feel well-prepared or each topic * review and practice questions follow each chapter to reinforce critical and hard-to-grasp concepts * running and comprehensive glossaries allow users to quickly and easily locate definitions of key terms

Rapid Manufacturing is a new area of manufacturing developed from a family of technologies known as Rapid Prototyping. These processes have already had the effect of both improving products and reducing their development time; this in turn resulted in the development of the technology of Rapid Tooling, which implemented Rapid Prototyping techniques to improve its own processes. Rapid Manufacturing has developed as the next stage, in which the need for tooling is eliminated. It has been shown that it is economically feasible to use existing commercial Rapid Prototyping systems to manufacture series parts in quantities of up to 20,000 and customised parts in quantities of hundreds of thousands. This form of manufacturing can be incredibly cost-effective and the process is far more flexible than conventional manufacturing. Rapid Manufacturing: An Industrial Revolution for the Digital Age addresses the academic fundamentals of Rapid Manufacturing as well as focussing on case studies and applications across a wide range of industry sectors. As a technology that allows manufacturers to create products without tools, it enables previously impossible geometries to be made. This book is abundant with images depicting the fantastic array of products that are now being commercially manufactured using these technologies. Includes contributions from leading researchers working at the forefront of industry. Features detailed illustrations throughout. Rapid Manufacturing: An Industrial Revolution for the Digital Age is a groundbreaking text that provides excellent coverage of this fast emerging industry. It will interest manufacturing industry practitioners in research and development, product design and materials science, as well as having a theoretical appeal to researchers and post-graduate students in manufacturing engineering, product design, CAD/CAM and CIFM.

The Technologies and Applications of Rapid Prototyping and Rapid Tooling

Product Design for Manufacture and Assembly

Manufacturing Science

An Industrial Revolution for the Digital Age

Introduction to Materials Science

Fundamentals of Instrumentation

This renowned text applies the powerful mathematical methods of fourier analysis to the analysis and synthesis of optical systems. These ubiquitous mathematical tools provide unique insights into the capabilities and limitations of optical systems in both imaging and information processing and lead to many fascinating applications, including the field of holography.

A revised version of a text which was first published in 1966. The book is designed as a general reference book for engineers and assumes a broad knowledge of current optical systems and their design. Additional topics include fibre optics, thin films and CAD systems.

Computer Vision and Image ProcessingFundamentals and ApplicationsCRC Press

A Metrological Reference

Testing of Textile Materials

Computer Vision and Image Processing

Optical Properties of Solids

Modern Optical Engineering

Intelligent Machining

The book familiarizes readers with fundamental concepts and issues related to computer vision and major approaches that address them. The focus of the book is on image acquisition and image formation models, radiometric models of image formation, image formation in the camera, image processing concepts, concept of feature extraction and feature selection for pattern classification/recognition, and advanced concepts like object classification, object tracking, image-based rendering, and image registration. Intended to be a companion to a typical teaching course on computer vision, the book takes a problem-solving approach.

Green Manufacturing: Fundamentals and Applications introduces the basic definitions and issues surrounding green manufacturing at the process,machine and system (including supply chain) levels. It also shows, by way of several examples from different industry sectors, the potential for substantial improvement and the paths to achieve the improvement. Additionally, this book discusses regulatory and government motivations for green manufacturing and outlines the path for making manufacturing more green as well as making production more sustainable. This book also: Discusses new engineering approaches for manufacturing and provides a path from traditional manufacturing to green manufacturing Addresses regulatory and economic issues surrounding green manufacturing Details new supply chains that need to be in place before going green Includes state-of-the-art case studies in the areas of automotive, semiconductor and medical areas as well as in the supply chain and packaging areas

Hailed as a groundbreaking and important textbook upon its initial publication, the latest iteration of Product Design for Manufacture and Assembly does not rest on those laurels. In addition to the expected updating of data in all chapters, this third edition has been revised to provide a top-notch textbook for university-level courses in product

Issues and Opportunities in Research

The Quality of Measurements

Micro-Cutting

ASM handbook

Bifurcations, Chaos, Control, and Applications

ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS

Machining, as a reliable manufacturing process, still offers unmatched capabilities in producing high quality three-dimensional parts from metals, polymers, ceramics, wood and composites. Advances in computational modeling and optimization methods enabled researchers to develop cost effective and high throughput modern machining processes. This book aims to provide recent advances intelligent machining for modern manufacturing engineering. It includes six chapters that provide basic fundamentals, modern machining processes, analytical and mechanistic modeling approaches, finite element modeling and systems based modeling, recent optimization methods and case studies.

Treating such contemporary design and development issues as identifying customer needs, design for manufacturing, prototyping, and industrial design, Product Design and Development, 3/e, by Ulrich and Eppinger presents in a clear and detailed way a set of product development techniques aimed at bringing together the marketing, design, and manufacturing functions of the enterprise. The integrative methods in the book facilitate problem solving and decision making among people with different disciplinary perspectives, reflecting the current industry trend to perform product design and development in cross-functional teams.

Engineering Metrology and Measurements is a textbook designed for students of mechanical, production and allied disciplines to facilitate learning of various shop-floor measurement techniques and also understand the basics of mechanical measurements.

Introduction to Fourier Optics

Composite Materials and Processing

Keys to Process Planning and Improvement

Micro-Cutting: Fundamentals and Applicationscomprehensively covers the state of the art research andengineering practice in micro/nano cutting: an area which isbecoming increasingly important, especially in modernmicro-manufacturing, ultraprecision manufacturing and high valuemanufacturing. This book provides basic theory, design and analysis ofmicro-toolings and machines, modelling methods and techniques, andintegrated approaches for micro-cutting. The fundamentalcharacteristics, modelling, simulation and optimization ofmicro/nano cutting processes are emphasized with particularreference to the predictabilty, producibility, repeatability andproductivity of manufacturing at micro and nano scales. The fundamentals of micro/nano cutting are applied to a varietyof machining processes including diamond turning, micromilling,micro/nano grinding/polishing, ultraprecision machining, and thedesign and implementation of micro/nano cutting process chains andmicromachining systems. Key features • Contains contributions from leading global experts • Covers the fundamental theory of micro-cutting • Presents applications in a variety of machiningprocesses • Includes examples of how to implement and applymicro-cutting for precision and micro-manufacturing Micro-Cutting: Fundamentals and Applications is an idealreference for manufacturing engineers, production supervisors,tooling engineers, planning and application engineers, as well asmachine tool designers. It is also a suitable textbook forpostgraduate students in the areas of micro-manufacturing,micro-engineering and advanced manufacturing methods.

Optical Properties of Solids covers the important concepts of intrinsic optical properties and photoelectric emission. The book starts by providing an introduction to the fundamental optical spectra of solids. The text then discusses Maxwell's equations and the dielectric function; absorption and dispersion; and the theory of free-electron metals. The quantum mechanical theory of direct and indirect transitions between bands; the applications of dispersion relations; and the derivation of an expression for the dielectric function in the self-consistent field approximation are also encompassed. The book further tackles current-current correlations; the fluctuation-dissipation theorem; and the effect of surface plasmons on optical properties and photoemission. People involved in the study of the optical properties of solids will find the book invaluable.

Theory of Elasticity and Plasticity is designed as a textbook for both undergraduate and postgraduate students of engineering in civil, mechanical and aeronautical disciplines. This book has been written with the objective of bringing the concepts of elasticity and plasticity to the students in a simplified and comprehensive manner. The basic concepts, definitions, theory as well as practical applications are discussed in a clear, logical and concise manner for better understanding. Starting with, general relationships between stress, strain and deformations, the book deals with specific problems on plane stress, plane strain and torsion in non-circular sections. Advanced topics such as membrane analogy, beams on elastic foundations and plastic analysis of pressure vessels are also discussed elaborately. For better comprehension, the text is well supported with: Large number of worked-out examples in each chapter. Well-labelled illustrations. Numerous Review Questions that reinforce the understanding of the subject. As all the concepts are covered extensively with a blend of theory and practice, this book will be a useful resource to the students.