

3 Energy Heat And Work

Chapter wise and Topic wise introduction to enable quick revision. Coverage of latest typologies of questions as per the Board latest Specimen papers Mind Maps to unlock the imagination and come up with new ideas. Concept videos to make learning simple. Latest Solved Paper with Topper's Answers Previous Years' Board Examination Questions and Marking scheme Answers with detailed explanation to facilitate exam-oriented preparation. Examiners comments & Answering Tips to aid in exam preparation. Includes Topics found Difficult & Suggestions for students. Dynamic QR code to keep the students updated for 2021 Exam paper or any further CISCE notifications/circulars Accompanying CD-ROM contains ... "computer tests and laboratories."--CD-ROM label.

This concise text provides an essential treatment of thermodynamics and a discussion of the basic principles built on an intuitive description of the microscopic behavior of matter. Aimed at a range of courses in mechanical and aerospace engineering, the presentation explains the foundations valid at the macroscopic level in relation to what happens at the microscopic level, relying on intuitive and visual explanations which are presented with engaging cases. With ad hoc, real-word examples related also to current and future renewable energy conversion technologies and two well-known programs used for thermodynamic calculations, FluidProp and StanJan, this text provides students with a rich and engaging learning experience.

Dr. Arnold Katz's internationally acclaimed classic, Physiology of the Heart, is now in its thoroughly revised Fifth Edition, incorporating the latest molecular biology research and extensively exploring the clinical applications of these findings. In the single authored, expert voice that is this book's unique strength, Dr. Katz provides a comprehensive overview of the physiological and biophysical basis of cardiac function, beginning with structure and proceeding to biochemistry, biophysics, and pathophysiology in arrhythmias, ischemia, and heart failure.

Emphasis is on the interrelationships of basic processes among the cell, cardiac muscle function, and the biophysics of contractile and electrical behavior. This edition includes new material on cell signaling and molecular biology.

Most of us are familiar with the concept of entropy, the dissipative process that indicates the degree of disorder or uncertainty in a closed physical system. Entropy is unidirectional and always proceeds forward in time, but it fails to account for many scientific paradoxes, such as life itself. Less well known is its complementary principle: syntropy, the subject of this book. Syntropy produces a continuous increase in complexity through the action of attractors that emanate from the future, and provides systems with their purpose and design. Rather than generating disorder via increasing differentiation, syntropy draws individuals and systems together by their common characteristics and goals. In a way, syntropy can be regarded as the life force that emanates from the unifying action of love.

Renewable Energy Systems and Desalination is a component of Encyclopedia of Water Sciences, Engineering and Technology Resources in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. The two volumes present state-of-the art subject matter of various aspects of Renewable Energy Systems and Desalination such as: A Short Historical Review Of Renewable Energy; Renewable Energy Resources; Desalination With Renewable Energy - A Review; Renewable Energy And Desalination Systems; Why Use Renewable Energy For Desalination; Thermal Energy Storage; Electrical Energy Storage; Tidal Energy; Desalination Using Tidal Energy; Wave Energy; Availability Of Wind Energy And Its Estimation; The Use Of Geothermal Energy In Desalination; Solar Radiation Energy (Fundamentals); High Temperature Solar Concentrators; Medium Temperature Solar Concentrators (Parabolic-Troughs Collectors); Low Temperature Solar Collectors; Solar Photovoltaic Energy Conversion; Photovoltaics; Flat-Plate Collectors; Large Active Solar Systems: Load; Integration Of Solar Pond With Water Desalination; Large Active Solar Systems: Typical Economic Analysis; Evacuated Tube Collectors; Parabolic Trough Collectors; Central Receivers; Configuration, Theoretical Analysis And Performance Of Simple Solar Stills; Development In Simple Solar Stills; Multi-Effect Solar Stills; Materials For Construction Of Solar Stills; Reverse Osmosis By Solar Energy; Solar Distillation; Solar Photochemistry; Photochemical Conversion Of Solar Energy; Availability Of Solar Radiation And Its Estimation; Economics Of Small Solar-Assisted Multipleeffect Seawater Distillation Plants; A Solar-Assisted Sea Water Multiple Effect Distillation Plant 15 Years Of Operating Performance (1985-1999);Mathematical Simulation Of A Solar Desalination Plant; Mathematical Models Of Solar Energy Conversion Systems; Multiple Effect Distillation Of Seawater Using Solar Energy – The Case Of Abu Dhabi Solar Desalination Plant; Solar Irradiation Fundamentals; Water Desalination By Humidification And Dehumidification Of Air, Seawater Greenhouse Process. These volumes are aimed at the following five major target audiences: University and College Students Educators, Professional Practitioners, Research Personnel and Policy and Decision Makers

The laws of thermodynamics the science that deals with energy and its transformation have wide applicability in several branches of engineering and science. The revised edition of this introductory text for undergraduate engineering courses covers the physical concepts of thermodynamics and demonstrates the underlying principles through practical situations. The traditional classical (macroscopic) approach is used in this text. Numerous solved examples and more than 550 unsolved problems (included as chapter-end exercises) will help the reader gain confidence for applying the principles of thermodynamics in real-life problems. Sufficient data needed for solving problems have been included in the appendices.

This textbook explains the meaning of heat and work and the definition of energy and energy systems. It describes the constructive role of entropy growth and makes the case that energy matters, but entropy growth matters more. Readers will learn that heat can be transferred, produced, and extracted, and that the understanding of generalized heat extraction will revolutionize the design of future buildings as thermal systems for managing low grade heat and greatly contribute to enhanced efficiency of tomorrow's energy systems and energy ecosystems. Professor Wang presents a coherent theory-structure of thermodynamics and clarifies the meaning of heat and the definition of energy in a manner that is both scientifically rigorous and engaging, and explains contemporary understanding of engineering thermodynamics in continuum of its historical evolution. The textbook reinforces students' grasp of concepts with end-of-chapter problems and provides a historical background of pioneering work by Black, Laplace, Carnot, Joule, Thomson, Clausius, Maxwell, Planck, Gibbs, Poincare and Prigogine. Developed primarily as a core text for graduate students in engineering programs, and as reference for professional engineers, this book maximizes readers' understanding and shines a light on new horizons for our energy future.

Over 19,000 total pages ... Public Domain U.S. Government published manual: Numerous illustrations and matrices. Published in the 1990s and after 2000. TITLES and CONTENTS: ELECTRICAL SCIENCES - Contains the following manuals: Electrical Science, Vol 1 - Electrical Science, Vol 2 - Electrical Science, Vol 3 - Electrical Science, Vol 4 - Thermodynamics, Heat Transfer, And Fluid Flow, Vol 1 - Thermodynamics, Heat Transfer, And Fluid Flow, Vol 2 - Thermodynamics, Heat Transfer, And Fluid Flow, Vol 3 - Instrumentation And Control, Vol 1 - Instrumentation And Control, Vol 2 Mathematics, Vol 1 - Mathematics, Vol 2 - Chemistry, Vol 1 - Chemistry, Vol 2 - Engineering Symbology, Prints, And Drawings, Vol 1 - Engineering Symbology, Prints, And Drawings, Vol 2 - Material Science, Vol 1 - Material Science, Vol 2 - Mechanical Science, Vol 1 - Mechanical Science, Vol 2 - Nuclear Physics And Reactor Theory, Vol 1 - Nuclear Physics And Reactor Theory, Vol 2. CLASSICAL PHYSICS - The Classical Physics Fundamentals includes information on the units used to measure physical properties; vectors, and how they are used to show the net effect of various forces; Newton's Laws of motion, and how to use these laws in force and motion applications; and the concepts of energy, work, and power, and how to measure and calculate the energy involved in various applications. * Scalar And Vector Quantities * Vector Identification * Vectors: Resultants And Components * Graphic Method Of Vector Addition * Component Addition Method * Analytical Method Of Vector Addition * Newton's Laws Of Motion * Momentum Principles * Force And Weight * Free-Body Diagrams * Force Equilibrium * Types Of Force * Energy And Work * Law Of Conservation Of

Energy * Power – ELECTRICAL SCIENCE: The Electrical Science Fundamentals Handbook includes information on alternating current (AC) and direct current (DC) theory, circuits, motors, and generators; AC power and reactive components; batteries; AC and DC voltage regulators; transformers; and electrical test instruments and measuring devices. * Atom And Its Forces * Electrical Terminology * Units Of Electrical Measurement * Methods Of Producing Voltage (Electricity) * Magnetism * Magnetic Circuits * Electrical Symbols * DC Sources * DC Circuit Terminology * Basic DC Circuit Calculations * Voltage Polarity And Current Direction * Kirchoff's Laws * DC Circuit Analysis * DC Circuit Faults * Inductance * Capacitance * Battery Terminology * Battery Theory * Battery Operations * Types Of Batteries * Battery Hazards * DC Equipment Terminology * DC Equipment Construction * DC Generator Theory * DC Generator Construction * DC Motor Theory * Types Of DC Motors * DC Motor Operation * AC Generation * AC Generation Analysis * Inductance * Capacitance * Impedance * Resonance * Power Triangle * Three-Phase Circuits * AC Generator Components * AC Generator Theory * AC Generator Operation * Voltage Regulators * AC Motor Theory * AC Motor Types * Transformer Theory * Transformer Types * Meter Movements * Voltmeters * Ammeters * Ohm Meters * Wattmeters * Other Electrical Measuring Devices * Test Equipment * System Components And Protection Devices * Circuit Breakers * Motor Controllers * Wiring Schemes And Grounding THERMODYNAMICS, HEAT TRANSFER AND FLUID FUNDAMENTALS. The Thermodynamics, Heat Transfer, and Fluid Flow Fundamentals Handbook includes information on thermodynamics and the properties of fluids; the three modes of heat transfer - conduction, convection, and radiation; and fluid flow, and the energy relationships in fluid systems. * Thermodynamic Properties * Temperature And Pressure Measurements * Energy, Work, And Heat * Thermodynamic Systems And Processes * Change Of Phase * Property Diagrams And Steam Tables * First Law Of Thermodynamics * Second Law Of Thermodynamics * Compression Processes * Heat Transfer Terminology * Conduction Heat Transfer * Convection Heat Transfer * Radiant Heat Transfer * Heat Exchangers * Boiling Heat Transfer * Heat Generation * Decay Heat * Continuity Equation * Laminar And Turbulent Flow * Bernoulli's Equation * Head Loss * Natural Circulation * Two-Phase Fluid Flow * Centrifugal Pumps INSTRUMENTATION AND CONTROL. The Instrumentation and Control Fundamentals Handbook includes information on temperature, pressure, flow, and level detection systems; position indication systems; process control systems; and radiation detection principles. * Resistance Temperature Detectors (Rtds) * Thermocouples * Functional Uses Of Temperature Detectors * Temperature Detection Circuitry * Pressure Detectors * Pressure Detector Functional Uses * Pressure Detection Circuitry * Level Detectors * Density Compensation * Level Detection Circuitry * Head Flow Meters * Other Flow Meters * Steam Flow Detection * Flow Circuitry * Synchro Equipment * Switches * Variable Output Devices * Position Indication Circuitry * Radiation Detection Terminology * Radiation Types * Gas-Filled Detector * Detector Voltage * Proportional Counter * Proportional Counter Circuitry * Ionization Chamber * Compensated Ion Chamber * Electroscopie Ionization Chamber * Geiger-Müller Detector * Scintillation Counter * Gamma Spectroscopy * Miscellaneous Detectors * Circuitry And Circuit Elements * Source Range Nuclear Instrumentation * Intermediate Range Nuclear Instrumentation * Power Range Nuclear Instrumentation * Principles Of Control Systems * Control Loop Diagrams * Two Position Control Systems * Proportional Control Systems * Reset (Integral) Control Systems * Proportional Plus Reset Control Systems * Proportional Plus Rate Control Systems * Proportional-Integral-Derivative Control Systems * Controllers * Valve Actuators MATHEMATICS The Mathematics Fundamentals Handbook includes a review of introductory mathematics and the concepts and functional use of algebra, geometry, trigonometry, and calculus. Word problems, equations, calculations, and practical exercises that require the use of each of the mathematical concepts are also presented. * Calculator Operations * Four Basic Arithmetic Operations * Averages * Fractions * Decimals * Signed Numbers * Significant Digits * Percentages * Exponents * Scientific Notation * Radicals * Algebraic Laws * Linear Equations * Quadratic Equations * Simultaneous Equations * Word Problems * Graphing * Slopes * Interpolation And Extrapolation * Basic Concepts Of Geometry * Shapes And Figures Of Plane Geometry * Solid Geometric Figures * Pythagorean Theorem * Trigonometric Functions * Radians * Statistics * Imaginary And Complex Numbers * Matrices And Determinants * Calculus CHEMISTRY The Chemistry Handbook includes information on the atomic structure of matter; chemical bonding; chemical equations; chemical interactions involved with corrosion processes; water chemistry control, including the principles of water treatment; the hazards of chemicals and gases, and basic gaseous diffusion processes. * Characteristics Of Atoms * The Periodic Table * Chemical Bonding * Chemical Equations * Acids, Bases, Salts, And Ph * Converters * Corrosion Theory * General Corrosion * Crud And Galvanic Corrosion * Specialized Corrosion * Effects Of Radiation On Water Chemistry (Synthesis) * Chemistry Parameters * Purpose Of Water Treatment * Water Treatment Processes * Dissolved Gases, Suspended Solids, And Ph Control * Water Purity * Corrosives (Acids And Alkalies) * Toxic Compound * Compressed Gases * Flammable And Combustible Liquids ENGINEERING SYMBOLOGY. The Engineering Symbology, Prints, and Drawings Handbook includes information on engineering fluid drawings and prints; piping and instrument drawings; major symbols and conventions; electronic diagrams and schematics; logic circuits and diagrams; and fabrication, construction, and architectural drawings. * Introduction To Print Reading * Introduction To The Types Of Drawings, Views, And Perspectives * Engineering Fluids Diagrams And Prints * Reading Engineering P&IDs * P&ID Print Reading Example * Fluid Power P&IDs * Electrical Diagrams And Schematics * Electrical Wiring And Schematic Diagram Reading Examples * Electronic Diagrams And Schematics * Examples * Engineering Logic Diagrams * Truth Tables And Exercises * Engineering Fabrication, Construction, And Architectural Drawings * Engineering Fabrication, Construction, And Architectural Drawing, Examples MATERIAL SCIENCE. The Material Science Handbook includes information on the structure and properties of metals, stress mechanisms in metals, failure modes, and the characteristics of metals that are commonly used in DOE nuclear facilities. * Bonding * Common Lattice Types * Grain Structure And Boundary * Polymorphism * Alloys * Imperfections In Metals * Stress * Strain * Young's Modulus * Stress-Strain Relationship * Physical Properties * Working Of Metals * Corrosion * Hydrogen Embrittlement * Tritium/Material Compatibility * Thermal Stress * Pressurized Thermal Shock * Brittle Fracture Mechanism * Minimum Pressurization-Temperature Curves * Heatup And Cooldown Rate Limits * Properties Considered * When Selecting Materials * Fuel Materials * Cladding And Reflectors * Control Materials * Shielding Materials * Nuclear Reactor Core Problems * Plant Material Problems * Atomic Displacement Due To Irradiation * Thermal And Displacement Spikes * Due To Irradiation * Effect Due To Neutron Capture * Radiation Effects In Organic Compounds * Reactor Use Of Aluminum MECHANICAL SCIENCE. The Mechanical Science Handbook includes information on diesel engines, heat exchangers, pumps, valves, and miscellaneous mechanical components. * Diesel Engines * Fundamentals Of The Diesel Cycle * Diesel Engine Speed, Fuel Controls, And Protection * Types Of Heat Exchangers * Heat Exchanger Applications * Centrifugal Pumps * Centrifugal Pump Operation * Positive Displacement Pumps * Valve Functions And Basic Parts * Types Of Valves * Valve Actuators * Air Compressors * Hydraulics * Boilers * Cooling Towers * Demineralizers * Pressurizers * Steam Traps * Filters And Strainers NUCLEAR PHYSICS AND REACTOR THEORY. The Nuclear Physics and Reactor Theory Handbook includes information on atomic and nuclear physics; neutron characteristics; reactor theory and nuclear parameters; and the theory of reactor operation. * Atomic Nature Of Matter * Chart Of The Nuclides * Mass Defect And Binding Energy * Modes Of Radioactive Decay * Radioactivity * Neutron Interactions * Nuclear Fission * Energy Release From Fission * Interaction Of Radiation With Matter * Neutron Sources * Nuclear Cross Sections And Neutron Flux * Reaction Rates * Neutron Moderation * Prompt And Delayed Neutrons * Neutron Flux Spectrum * Neutron Life Cycle * Reactivity * Reactivity Coefficients * Neutron Poisons * Xenon * Samarium And Other Fission Product Poisons * Control Rods * Subcritical Multiplication * Reactor Kinetics * Reactor

A heat pump system can produce an amount of heat energy that is greater than the amount of energy used to run the heat pump system. Thus, a heat pump system is considered to be a machine system that can use energies efficiently, as is the load leveling air-conditioning system utilizing unutilized energies at high levels. Adaptations of gas turbines for industrial, utility, and marine-propulsion applications have long been accepted as means for generating power with high efficiency and ease of maintenance. Cogeneration with gas turbine is frequently

defined as the sequential production of useful thermal energy and shaft power from a single energy source. For applications that generate electricity, the power can either be used internally or supplied to the utility grid. This Special Issue intends to provide an overview of the existing knowledge related with various aspects of "Small-Scale Energy Systems with Gas Turbines and Heat Pumps", and contributions on, but not limited to the following subjects were encouraged: wake of stator vane to improve sealing effectiveness; gas turbine cycle with external combustion chamber for prosumer and distributed energy systems; computational simulation of gas turbine engine operating with different blends of biodiesel; experimental methodology and facility for the engine performance and emissions evaluation using jet and biodiesel blends; experimental analysis of an air heat pump for heating service; hybrid fuel cell-Brayton cycle for combined heat and power; design analysis of micro gas turbines in closed cycles. Seven papers were published in the Special Issue out of a total of 12 submitted. Sport Nutrition, Third Edition, uses a physiological basis to provide an in-depth look at the science supporting nutrition recommendations. Students will come away with an understanding of nutrition as it relates to sport and the influence of nutrition on performance, training, and recovery.

Winner of an Outstanding Academic Title Award from CHOICE Magazine Encyclopedia of Environmental Management gives a comprehensive overview of environmental problems, their sources, their assessment, and their solutions. Through in-depth entries and a topical table of contents, readers will quickly find answers to questions about specific pollution and management issues. Edited by the esteemed Sven Erik Jørgensen and an advisory board of renowned specialists, this four-volume set shares insights from more than 500 contributors—all experts in their fields. The encyclopedia provides basic knowledge for an integrated and ecologically sound management system. Nearly 400 alphabetical entries cover everything from air, soil, and water pollution to agriculture, energy, global pollution, toxic substances, and general pollution problems. Using a topical table of contents, readers can also search for entries according to the type of problem and the methodology. This allows readers to see the overall picture at a glance and find answers to the core questions: What is the pollution problem, and what are its sources? What is the "big picture," or what background knowledge do we need? How can we diagnose the problem, both qualitatively and quantitatively, using monitoring and ecological models, indicators, and services? How can we solve the problem with environmental technology, ecotechnology, cleaner technology, and environmental legislation? How do we address the problem as part of an integrated management strategy? This accessible encyclopedia examines the entire spectrum of tools available for environmental management. An indispensable resource, it guides environmental managers to find the best possible solutions to the myriad pollution problems they face. Also Available Online This Taylor & Francis encyclopedia is also available through online subscription, offering a variety of extra benefits for researchers, students, and librarians, including: Citation tracking and alerts Active reference linking Saved searches and marked lists HTML and PDF format options Contact us to inquire about subscription options and print/online combination packages. US: (Tel) 1.888.318.2367 / (email) e-reference@taylorandfrancis.com International: (Tel) +44 (0) 20 7017 6062 / (email) online.sales@tandf.co.uk

Discover the fundamentals and tools needed to model, design, and build efficient, clean low-carbon energy systems with this unique textbook.

Thermodynamics is fundamental to university and college curricula in chemistry, physics, engineering and many life sciences around the world. It is also notoriously difficult for students to understand, learn and apply. What makes this book different, and special, is the clarity of the text. The writing style is fluid, natural and lucid, and everything is explained in a logical and transparent manner. Thermodynamics is a deep, and important, branch of science, and this book does not make it "easy". But it does make it intelligible. This book introduces a new, 'Fourth Law' of Thermodynamics' based on the notion of Gibbs free energy, which underpins almost every application of thermodynamics and which the authors claim is worthy of recognition as a 'law'. The last four chapters bring thermodynamics into the twenty-first century, dealing with bioenergetics (how living systems capture and use free energy), macromolecule assembly (how proteins fold), and macromolecular aggregation (how, for example, virus capsids assemble). This is of great current relevance to students of biochemistry, biochemical engineering and pharmacy, and is covered in very few other texts on thermodynamics. The book also contains many novel and effective examples, such as the explanation of why friction is irreversible, the proof of the depression of the freezing point, and the explanation of the biochemical standard state. Gain a detailed understanding of the fundamental concepts of chemistry and their engineering applications with this fully revised second edition. Catering to the needs of first and second semester undergraduate students from all branches of engineering taking courses on engineering chemistry, it offers new material on topics such as periodic properties, structure and bonding, gaseous states, ionic equilibrium, oxidation and reduction, Werner's coordination theory, Sidgwick coordination theory, valence bond theory, crystal field theory, bonding in coordination compounds, and isomerism in coordination compounds. Lucid language and an easy-to-learn approach help students to understand the basic concepts, use them to construct engineering materials, and solve problems associated with them. Each chapter is further strengthened by numerous examples and review questions.

This classic sets forth the fundamentals of thermodynamics and kinetic theory simply enough to be understood by beginners, yet with enough subtlety to appeal to more advanced readers, too.

The basic principles are explained with examples from student's daily life situations and every topic is followed by thought-provoking questions. Relevant illustrations have been given, wherever necessary. The language used is simple and lucid which keeps the interest of the students alive till the end of the topic.

This textbook has been designed to meet the needs of B.Sc. Second Semester students of Chemistry as per the UGC Choice Based Credit System (CBCS). With its traditional approach to the subject, this textbook lucidly explains principles of chemistry. Important topics such as chemical energetics, chemical/ionic equilibrium, aromatic hydrocarbons, alkyl/aryl halides, alcohols, phenols, ethers, aldehydes and ketones are aptly discussed to give an overview of physical and organic chemistry. Laboratory work has also been included to help students achieve solid conceptual understanding and learn experimental procedures.

Combining broad coverage with an innovative use of pedagogy, Atkins' Physical Chemistry remains the textbook of choice for studying physical chemistry. Significant re-working of the text design makes this edition more accessible for students, while also creating a clean and effective text that is more flexible for instructors to teach from.

This textbook fosters information exchange and discussion on all aspects of introductory matters of modern mechanical engineering from a number of perspectives including: mechanical engineering as a profession, materials and manufacturing processes, machining and machine tools, tribology and surface engineering, solid mechanics, applied and computational mechanics, mechanical design, mechatronics and robotics, fluid mechanics and heat transfer, renewable energies, biomechanics, nanoengineering and nanomechanics. At the end of each chapter, a list of 10 questions (and answers) is provided.

This book explores a different approach to energy and thermodynamics based on the following statements: 1. All energy has two components: work energy and heat energy 2. Work and heat are byproducts of the transfer of energy. 3. Without the transfer of

energy there is no transfer of work or heat. 4. Work can create heat but heat can't create work

With its fresh reader-friendly design, MATHEMATICS FOR ELECTRICITY AND ELECTRONICS, 4E is more current, comprehensive, and relevant than ever before. Packed with practical exercises and examples, it equips learners with a thorough understanding of essential algebra and trigonometry for electricity and electronics technology, while helping them improve critical thinking skills. Well-illustrated information sharpens the reader's ability to think quantitatively, predict results, and troubleshoot effectively, while drill and practice sets reinforce comprehension. To ensure mastery of the latest ideas and technology, the text thoroughly explains all mathematical concepts, symbols, and formulas required by future technicians and technologists. In addition, a new homework solution offers a wealth of online resources to maximize study efforts as well as provides an online testing tool for instructors. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

This textbook on atmospheric thermodynamics is for students of meteorology or atmospheric science. It also serves as a reference text for working professionals in meteorology and weather forecasting. It is unique because it provides complete, calculus-based derivations of basic physics from first principles, and connects mathematical relationships to real-world, practical weather forecasting applications. Worked examples and practice problems are included throughout.

[Copyright: dc27749cb8ae2ee5451fe366a14f380f](https://www.copyright.com/lookup.do?copyrightId=dc27749cb8ae2ee5451fe366a14f380f)