

Physics Notes Class 11 CHAPTER 12

THERMODYNAMICS

The branch dealing with measurement of temperature is called thermometry and the devices used to measure temperature are called thermometers.

Heat

Heat is a form of energy called thermal energy which flows from a higher temperature body to a lower temperature body when they are placed in contact.

Heat or thermal energy of a body is the sum of kinetic energies of all its constituent particles, on account of translational, vibrational and rotational motion.

The SI unit of heat energy is joule (J).

The practical unit of heat energy is calorie.

$$1 \text{ cal} = 4.18 \text{ J}$$

1 calorie is the quantity of heat required to raise the temperature of 1 g of water by 1°C.

Mechanical energy or work (W) can be converted into heat (Q) by $1 \text{ W} = JQ$

where J = Joule's mechanical equivalent of heat.

J is a conversion factor (not a physical quantity) and its value is 4.186 J/cal.

Temperature

Temperature of a body is the degree of hotness or coldness of the body. A device which is used to measure the temperature, is called a thermometer.

Highest possible temperature achieved in laboratory is about 10⁸ while lowest possible temperature attained is 10⁻⁸ K.

Branch of Physics dealing with production and measurement temperature close to 0 K is known as cryogenics, while that dealing with the measurement of very high temperature is called pyrometry. Temperature of the core of the sun is 10⁷ K while that of its surface 6000 K.

NTP or STP implies 273.15 K (0°C = 32°F).

Different Scale of Temperature

Physics Notes Class 11 Chapter 12 Thermodynamics

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Physics Notes Class 11 Chapter 12 Thermodynamics:

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Questions Chapter 28 Rotational Motion Questions Chapter 29 Second Law of Thermodynamics Questions Chapter 30 Simple Harmonic Motion Questions Chapter 31 Special Relativity Questions Chapter 32 Straight Line Motion Questions Chapter 33 Transverse Waves Questions Chapter 34 Two and Three Dimensional Motion Questions Chapter 35 Vector Quantities Questions Chapter 36 Work Kinetic Energy Theorem Questions The Alternating Fields and Currents Quiz Questions PDF e Book Chapter 1 interview questions and answers on Alternating current damped oscillations in an RLS circuit electrical mechanical analog forced and free oscillations LC oscillations phase relations for alternating currents and voltages power in alternating current circuits transformers The Astronomical Data Quiz Questions PDF e Book Chapter 2 interview questions and answers on Aphelion distance from earth eccentricity of orbit equatorial diameter of planets escape velocity of planets gravitational acceleration of planets inclination of orbit to earth s orbit inclination of planet axis to orbit mean distance from sun to planets moons of planets orbital speed of planets perihelion period of rotation of planets planet densities planets masses sun earth and moon The Capacitors and Capacitance Quiz Questions PDF e Book Chapter 3 interview questions and answers on Capacitor in parallel and in series capacitor with dielectric charging a capacitor cylindrical capacitor parallel plate capacitor The Circuit Theory Quiz Questions PDF e Book Chapter 4 interview questions and answers on Loop and junction rule power series and parallel resistances single loop circuits work energy and EMF The Conservation of Energy Quiz Questions PDF e Book Chapter 5 interview questions and answers on Center of mass and momentum collision and impulse collisions in one dimension conservation of linear momentum conservation of mechanical energy linear momentum and Newton s second law momentum and kinetic energy in collisions Newton s second law for a system of particles path independence of conservative forces work and potential energy The Coulomb s Law Quiz Questions PDF e Book Chapter 6 interview questions and answers on Charge is conserved charge is quantized conductors and insulators and electric charge The Current Produced Magnetic Field Quiz Questions PDF e Book Chapter 7 interview questions and answers on Ampere s law and law of Biot Savart The Electric Potential Energy Quiz Questions PDF e Book Chapter 8 interview questions and answers on Introduction to electric potential energy electric potential and equipotential surfaces The Equilibrium Indeterminate Structures Quiz Questions PDF e Book Chapter 9 interview questions and answers on Center of gravity density of selected materials of engineering interest elasticity equilibrium indeterminate structures ultimate and yield strength of selected materials of engineering interest and Young s modulus of selected materials of engineering interest The Finding Electric Field Quiz Questions PDF e Book Chapter 10 interview questions and answers on Electric field electric field due to continuous charge distribution electric field lines flux and Gauss law The First Law of Thermodynamics Quiz Questions PDF e Book Chapter 11 interview questions and answers on Absorption of heat by solids and liquids Celsius and Fahrenheit scales coefficients of thermal expansion first law of thermodynamics heat of fusion of common substances heat of transformation heat of vaporization of common substances introduction to thermodynamics molar specific heat substance specific heat in

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Kelvin, Thermodynamics and the Natural World M.W. Collins,R.C. Dougal,C. Koenig,I. Ruddock, Strathclyde University, UK,2015-12-14 This volume looks afresh at the life and works of Lord Kelvin including his standing and relationships with Charles Darwin T S Huxley and the X club thereby throwing new light on the nineteenth century conflict between the British energy and biology specialists It focuses on two principal issues Firstly there is the contribution made by Kelvin to the formulation of the Laws of Thermodynamics

both personal and in the content of the scientific communications exchanged with other workers such as Joule and Clausius Secondly there is Kelvin s impact on the wider field of science such as thermoelectricity and geology determination of the age of the earth Of late a number of studies and initiatives including the Centenary celebrations of Kelvin s death and exhibits such as that of the Revolutionary Scientist in the Hunterian Museum Glasgow have been undertaken aiding the redefinition of Kelvin s greatness and achievements The book also raises awareness to improve our approach to the teaching of elementary thermodynamics by attempting to empathise with Kelvin s perspective It is completed by a full biography overviews of various monuments to his memory and short Stories in Pictures on the Atlantic cable Maxwell s Demon the universities associated with the development of thermodynamics and the Royal Society of Edinburgh Scientists and engineers with an interest in thermodynamics and anyone interested in the work of Lord Kelvin will find benefit in Kelvin Thermodynamics and the Natural World Chemical Thermodynamics Victor CM Freestone,2025-06-13 Thermodynamics can never be made easy but with the right approach and a consistent use of scientific terms it can be made less opaque and it can give a person who is prepared to try an insight into how science explains why things happen the way they do The approach adopted in this book will give readers a better understanding of how science works together with its limitations Unfortunately thermodynamics or at least some parts of it is a subject which apart from quantum mechanics probably causes most confusion and bewilderment amongst scientists The majority of students do not understand or get thermodynamics and it is considered a hard or difficult subject There are multiple reasons for this There is of course mathematics and many thermodynamic texts appear to be lists upon lists of differential equations Another reason is that thermodynamics is as often as not poorly taught by teachers lecturers who themselves do not understand or appreciate or have any interest in the subject often all three This results not only in a lack of scientific rigorousness in the teaching of the subject with the resulting confusion and sometimes teachers lecturers and authors just get it plain wrong this occurs surprisingly often However it need not be like this and although mathematics including calculus is required it can be kept to a relatively elementary level in order to obtain an understanding of this most important of subjects No one can pretend that the subject is easy but it can be made more accessible by a rigorous definition of terms and concepts and ensuring that a consistency of use of these definitions is maintained Highlighting the benefits of thermodynamics in practical science the text gives an intuitive grasp of the major concepts of thermodynamics such as energy and entropy Provides a new pedagogic approach to understanding and teaching chemical thermodynamics Starting with a set of basic simple assumptions about what constitutes topics such as an ideal gas theories are developed in a clear concise and accessible manner that will either answer or at the very least give an insight into a surprising range of scientific phenomena including energy heat temperature properties of gases time and quantum theory Assumes that the reader has essentially no knowledge of the subject Mathematics including calculus is kept to a relatively elementary level in order to obtain an understanding of this most important of subjects Provides the reader

with a better understanding of how science works together with its limitations

Physics Peter Lindenfeld, Suzanne White Brahmia, 2011-03-02 Today's physics textbooks have become encyclopedic offering students dry discussions rote formulas and exercises with little relation to the real world **Physics The First Science** takes a different approach by offering uniquely accessible student friendly explanations historical and philosophical perspectives and mathematics in easy to comprehend dialogue It emphasizes the unity of physics and its place as the basis for all science Examples and worked solutions are scattered throughout the narrative to help increase understanding Students are tested and challenged at the end of each chapter with questions ranging from a guided review designed to mirror the examples to problems reasoning skill building exercises that encourage students to analyze unfamiliar situations and interactive simulations developed at the University of Colorado With their experience instructing both students and teachers of physics for decades Peter Lindenfeld and Suzanne White Brahmia have developed an algebra based physics book with features to help readers see the physics in their lives Students will welcome the engaging style condensed format and economical price

Universal Themes of Bose-Einstein Condensation Nick P. Proukakis, David W. Snoke, Peter B. Littlewood, 2017-04-27 Covering general theoretical concepts and the research to date this book demonstrates that Bose Einstein condensation is a truly universal phenomenon

Physics Briefs, 1990

Cellular Automata And Complexity Stephen Wolfram, 2018-03-08 Are mathematical equations the best way to model nature For many years it had been assumed that they were But in the early 1980s Stephen Wolfram made the radical proposal that one should instead build models that are based directly on simple computer programs Wolfram made a detailed study of a class of such models known as cellular automata and discovered a remarkable fact that even when the underlying rules are very simple the behaviour they produce can be highly complex and can mimic many features of what we see in nature And based on this result Wolfram began a program of research to develop what he called A Science of Complexity The results of Wolfram's work found many applications from the so called Wolfram Classification central to fields such as artificial life to new ideas about cryptography and fluid dynamics This book is a collection of Wolfram's original papers on cellular automata and complexity Some of these papers are widely known in the scientific community others have never been published before Together the papers provide a highly readable account of what has become a major new field of science with important implications for physics biology economics computer science and many other areas

Applied Mechanics Reviews, 1993

Chemica Scripta, 1973

B.H. Blackwell B.H. Blackwell Ltd, 1928

Mathematical Reviews, 2008

English Mechanic and Mirror of Science and Art, 1919

Chemical Engineering Catalog, 1921

Wavefront Distortions in Power Optics Society of Photo-optical Instrumentation Engineers, 1981

Scientific American, 1901

Monthly Weather Review, 1899

Chemical Engineering Education, 1985

Bulletin of the Institution of Engineers (India). Institution of Engineers (India), 1965

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Table of Contents Physics Notes Class 11 Chapter 12 Thermodynamics

1. Understanding the eBook Physics Notes Class 11 Chapter 12 Thermodynamics
 - The Rise of Digital Reading Physics Notes Class 11 Chapter 12 Thermodynamics
 - Advantages of eBooks Over Traditional Books
2. Identifying Physics Notes Class 11 Chapter 12 Thermodynamics
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Physics Notes Class 11 Chapter 12 Thermodynamics
 - User-Friendly Interface
4. Exploring eBook Recommendations from Physics Notes Class 11 Chapter 12 Thermodynamics
 - Personalized Recommendations
 - Physics Notes Class 11 Chapter 12 Thermodynamics User Reviews and Ratings
 - Physics Notes Class 11 Chapter 12 Thermodynamics and Bestseller Lists
5. Accessing Physics Notes Class 11 Chapter 12 Thermodynamics Free and Paid eBooks
 - Physics Notes Class 11 Chapter 12 Thermodynamics Public Domain eBooks
 - Physics Notes Class 11 Chapter 12 Thermodynamics eBook Subscription Services
 - Physics Notes Class 11 Chapter 12 Thermodynamics Budget-Friendly Options

6. Navigating Physics Notes Class 11 Chapter 12 Thermodynamics eBook Formats
 - ePub, PDF, MOBI, and More
 - Physics Notes Class 11 Chapter 12 Thermodynamics Compatibility with Devices
 - Physics Notes Class 11 Chapter 12 Thermodynamics Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Physics Notes Class 11 Chapter 12 Thermodynamics
 - Highlighting and Note-Taking Physics Notes Class 11 Chapter 12 Thermodynamics
 - Interactive Elements Physics Notes Class 11 Chapter 12 Thermodynamics
8. Staying Engaged with Physics Notes Class 11 Chapter 12 Thermodynamics
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Physics Notes Class 11 Chapter 12 Thermodynamics
9. Balancing eBooks and Physical Books Physics Notes Class 11 Chapter 12 Thermodynamics
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Physics Notes Class 11 Chapter 12 Thermodynamics
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Physics Notes Class 11 Chapter 12 Thermodynamics
 - Setting Reading Goals Physics Notes Class 11 Chapter 12 Thermodynamics
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Physics Notes Class 11 Chapter 12 Thermodynamics
 - Fact-Checking eBook Content of Physics Notes Class 11 Chapter 12 Thermodynamics
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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