

Multiple Choice Questions on

Energy



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The Energy and Resources Institute

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*Dedicated
to my parents,
Awantika, Ananya, and Awatans.*



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SECRETARY
GOVERNMENT OF INDIA
MINISTRY OF NEW AND RENEWABLE ENERGY

FOREWORD

Everything in this world moves due to energy. Energy is an important indicator of the development and prosperity of a country. It is an essential input in all sectors and in the economy of any country. The standard of living of a country can be directly related to its per capita energy consumption. Normally, the per capita energy consumption is referred to as the consumption of electricity. Energy is a key player in the social, economical, industrial, and agricultural growth and development of a country.

The growth of an economy is largely dependent on the adequate supply of energy. Energy demand is broadly from five major sectors, namely, households, industry, transport, electric power generation, and agriculture. Renewable energy obtained from solar, wind, biomass, hydro or any other resource is capable of contributing to meet the energy demand for these five sectors to some extent.

The worldwide per capita energy consumption is increasing due to rapid industrialization, urbanization, growth in agriculture, transport, and service sectors, besides technological advancement and advent of various gadgets used in daily life. There is a need to maintain a balance between energy production and environmental degradation. Energy production through fossil fuels often leads to environmental pollution. Hence, the use of renewable energy is becoming imperative day by day.

Although we experience the importance of energy in our daily lives, energy as an exclusive subject does not find prominence in our education system. Only few institutions offer exclusive courses on energy. Energy related questions are also asked in many competitive examinations. Hence, there is a need to popularize it in the country's formal education system. At the same time, there is also a need for books and reference material on the subject.

The author has made an attempt in this book to present the subject in a simple and interesting way through multiple choice questions, which is the most common format of various examinations nowadays. Almost all areas of energy, including renewable energy, have been touched upon in this book. I am sure that the book will be a useful reference material for students, aspirants of different competitive examinations, and professionals engaged in energy related work as well.

(Deepak Gupta)



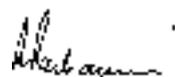
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FOREWORD

Energy issues came to the fore as a part of public policy almost 40 years ago when oil prices quadrupled almost instantaneously in the wake of the oil embargo imposed by certain members of the Organization of the Petroleum Exporting Countries (OPEC) on supply of oil to specific countries. Prior to that, the price of oil globally had remained relatively low and, at the same time, electricity prices also generally continued to decline as a result of economies of scale and larger and more efficient power plants for generating electricity. In the 1970s and 1980s, however, energy which had been taken for granted as a factor of production in all goods and services was seen as a commodity likely to grow increasingly scarce. It would, therefore, need to be used more efficiently while the world also pursued the possibility of substitutes to fossil fuels. For a variety of reasons, oil prices crashed in 1985 and remained relatively low till just a few years ago.

There is now a need to change mindsets and ensure the development of new technologies, which would not only enable more efficient use of energy but also greater use of renewable sources that exist in abundance in several parts of the world. Government policies are determined largely by public preferences and priorities, particularly in democratic societies. Hence, the pursuit of renewable energy choices would require large-scale awareness on their potential and promise by which the public at large would be able to move governments, businesses, and other stakeholders towards a renewable energy revolution.

It is in this context that these multiple choice questions on energy are an extremely effective and simple way of informing readers of the excitement and enormous potential associated with renewable sources of energy. These, of course, have to be seen within the larger context of supply and use of all forms of energy. What is critically important is for publications of this nature to be read by people at all levels and in all parts of this country, so that we could bring about a true revolution in energy supply, making it possible for India to emerge as an example to the rest of the world and as a society driven by a sustainable and secure energy future.



(R K Pachauri)

Director-General, The Energy and Resources Institute
Chairman, Intergovernmental Panel on Climate Change

PREFACE

Energy is an integral part of our lives. We need energy to do all kinds of work. Though we do not realize it, energy is all pervasive. Human beings and animals derive their energy from food, which is prepared by plants using solar energy. Thus, the very basis of our lives is energy. Lots of energy was absorbed and released during the creation of the universe. Thus, it is energy that sustains the universe even today.

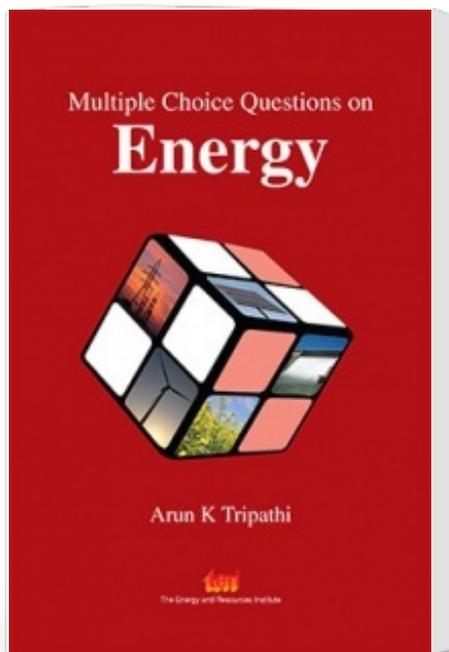
Although the concept of energy is taught at the primary level and is included in various streams, it is rarely taught as an exclusive subject at the higher education level. In fact, the concept of energy is meant more for lifelong learning rather than studying as a subject. A few universities and engineering institutions have introduced exclusive degree courses on energy; however, technical books on energy need to be developed and made available commensurate with the latest developments.

Since energy is such an important aspect of our lives, it needs to be paid due attention in education and awareness. This book attempts to present the subject in a simple and precise manner for students, aspirants of various competitive exams, and even laymen. Keeping in view the present trend of various exams, the various types of energy have been presented in the form of multiple choice questions, which is the most common pattern of examination in every field of study in the science stream. Energy-related questions figure in various national-level competitive examinations, besides featuring in question papers for examinations in bachelor degree courses on engineering and technology.

This book briefly covers various forms of energy, including mechanical energy, electrical energy, chemical energy, thermal energy, nuclear energy, magnetic energy, sound energy, energy from petroleum and gas, light energy, and renewable energy, including solar energy, wind energy, biomass energy, small hydropower, tidal and ocean energy, hydrogen energy, geothermal energy. The aspects of energy conservation have also been taken into account, defining the need for energy efficiency and energy conservation measures to be taken by various sectors.

The first chapter discusses the concept of energy, the law of conservation of energy, and measurement, transformation, characteristics of energy. General questions on energy have also been provided in

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