



### CHAPTER-1 PHYSICAL WORLD

[WWW.NEUTRONCLASSES.COM](http://WWW.NEUTRONCLASSES.COM)

***Q. 1. Some of the most profound statements on the nature of science have come from Albert Einstein, one of the greatest scientist of all time. What do you think did Einstein mean when he said “The most incomprehensible thing about the world is that it is comprehensible.” [NCERT Ex. Q. 1.1, Page 13]***

Ans. The word comprehensible means understandable. When we look at nature and natural phenomenon, we fail to understand their complexities with ordinary knowledge. But with scientific methods, we come to know that only a few basic laws and principles can very well explain most of them. ‘So many phenomenon of world, governed and understood by only a few scientific principles, are otherwise not easily understandable’.

***Q. 2. “Every great physical theory starts as a hearsay and ends as a dogma.” Give some examples from the history of science of the validity of this incisive remark. [NCERT Ex. Q. 1.2, Page 13]***

Ans. Whenever a good theory is stated it is treated like a rumor (hearsay) but after passage of time and reverification it becomes a principle and authority (dogma). Galileo was punished for his theory that earth revolves around the sun because at that time it was felt by people that he was spreading wrong information. After passage of some time, Kepler as well as Newton supported his theory. Now this theory is an authentic principle.

***Q. 3. “Politics is the art of possible.” Similarly, “Science is the art of soluble.” Explain this beautiful aphorism on the nature and practice of science. [NCERT Ex. Q. 1.3, Page 13]***

Ans. It is said that word ‘impossible’ is missing in the dictionary of a politician. Politics is, therefore, treated as an art of making every impossible thing possible for a politician. Similarly, there is hardly any scientific problem which cannot be solved by a scientific approach. Science is therefore, treated as an art of getting solutions for those problems also which appear to have no solution because even most complex phenomena of nature have their explanations in terms of a few basic laws of Physics.

***Q. 4. Though India now has a large base in science and technology which is fast expanding, it is still a long way from realizing its potential for becoming a world leader in science. Name some important factors, which in your view have hindered the advancement of science in India. [NCERT Ex. Q. 1.4, Page 13]***

Ans. (i) Indian society is full of superstitions. So, they slowly adopt the technology and innovation.

(ii) Bureaucracy in science education.

(iii) Highly poor condition and infrastructure for quality education and research in schools and colleges of India.

(iv) No collaboration between industries and scholars in India.

(v) Lack of scientific planning.

***Q. 5. No physicist has ever ‘seen’ an ‘electron’. Yet all physicists believe in the existence of electrons. An intelligent but superstitious man advances this analogy to argue that ‘ghosts’***





***exist even though no one has seen one. How will you refute his argument ? [NCERT Ex. Q. 1.5, Page 13]***

Ans. It is simply a superstition that ghosts exist. There is not even a single authentic evidence that proves that ghosts exist. On the other hand it is a fact that atoms exist. There are many examples to prove this fact, for eg. atomic power plant, atomic bombs, atomic clocks etc.,

***Q. 6. The shells of crabs found around a particular coastal location in Japan seem mostly to resemble the legendary face of the Samurai. Given below are the two explanations of this observed fact. Which of these strikes you as a scientific explanation ?***

(a) A tragic sea accident several centuries ago drowned a young Samurai. As a tribute to his bravery, nature through its inscrutable ways immortalized his face by imprinting it on the crab shells in that area.

(b) After the sea tragedy, fisherman in that area in a gesture of honour to their dead hero, let free any crab shell caught by them which accidentally had a shape resembling the face of the Samurai. Consequently, the particular shape of the crab shell survived longer and in course of time, the shape was genetically propagated. This is an example of evolution by artificial selection. [NCERT Ex. Q. 1.6, Page 13]

Ans. (b) It is a correct scientific explanation of the observed fact .

***Q. 7. The Industrial Revolution in England and Western Europe more than two centuries ago was triggered by some key scientific and technological advances. What were these advances ? [NCERT Ex. Q. 1.7, Page 14]***

Ans. Some of the key scientific and industrial advances which led to industrial revolution prior to 1750 A.D. were (i) steam engine, (ii) blast furnace, (iii) power loom etc.

***Q. 8. It is often said that the world is witnessing now a second Industrial Revolution which will transform the society as radically as did the first. List some key contemporary areas of science and technology, which are responsible for this revolution. [NCERT Ex. Q. 1.8, Page 14]***

Ans. The key areas which are transforming radically the present society are (i) super computers, (ii) biotechnology, (iii) development of super conductors at room temperature, (iv) Nanotechnology, (v) robots.

***Q. 9. Write in about 1,000 words a fiction piece based on your speculation on the science and technology of the twenty second century. [NCERT Ex. Q. 1.9, Page 14]***

Ans. Our Scientists launch a spaceship towards a distant star, about 500 light year away. This spaceship contains matter and antimatter and uses the water as fuel. The spaceship also has some nanorobots as passengers who consume the electricity generated from an electric motor with nanotubes and superconducting wires at very high temperature. OR Imagine you along with your friends are in a spaceship which is moving towards Mars. The body of the spaceship is made of specially designed matter which becomes more harder as its temperature increases. The spaceship is using nuclear fuel and there are three nuclear power plants in spaceship. Two of them work alternatively and the third is for emergency. The speed of the spaceship is very high and all of you are very happy. The energy produced in power plants is converted into electric energy which runs the motors of the spaceship. You along with your friends reach





safely on Mars, collects data, takes photographs and then returns to Earth. On the return journey, the spaceship collides with an object in the space due to which two power plants stop to work. Now, only one power plant is working and due to overheating its efficiency is decreasing continuously. You and your friends try to reduce the temperature of the power plant by flowing air in the plant and try to repair the fuse of the other power plants. Finally, fuse of one other plant is required and start to work before the first plant crosses the danger limit of an excess of temperature. Finally, you and your friends return safely to earth.

***Q. 10. Attempt to formulate your 'moral' views on the practice of science. Imagine yourself stumbling upon a discovery, which has a great academic interest but is certain to have nothing but dangerous consequences for the human society. How, if at all, will you resolve your dilemma ? [NCERT Ex. Q. 1.10, Page 14]***

Ans. Yes, any discovery good or bad must be made public. Something which appears dangerous today, may be put to use in some form later. So, a discovery, which reveals a truth of nature, should not be concealed.

***Q. 11. Science, like any knowledge, can be put to good or bad use, depending on the user. Given below are some of the applications of science. Formulate your views on whether the particular application is good, bad or something that cannot be so clearly categorized :***

***(i) Mass vaccination against small pox to curb and finally eradicate this disease from the population. (This has already been successfully done in India.)***

***(ii) Television for eradication of illiteracy and for mass communication of news and ideas.***

***(iii) Parental sex determination.***

***(iv) Computers for increase in work efficiency.***

***(v) Putting artificial satellites around the Earth.***

***(vi) Development of nuclear weapons.***

***(vii) Development of new and powerful techniques of chemical and biological warfare.***

***(viii) Purification of water for drinking.***

***(ix) Plastic surgery.***

***(x) Cloning. [NCERT Ex. Q. 1.11, Page 14]***

Ans. (i) Good, (ii) Good, (iii) Bad, (iv) Good, (v) Good, (vi) Bad, (vii) Bad, (viii) Good, (ix) Good, (x) Good.

***Q. 12. India has had a long and unbroken tradition of great scholarship in mathematics, astronomy, linguistics, logic and ethics yet, in parallel with this, several superstitious and obscurantist attitudes and practices flourished in our society and unfortunately continue even today among many educated people too. How will you use your knowledge of science to develop strategies to counter these attitudes? [NCERT Ex. Q. 1.12, Page 14]***

Ans. We can remove these illogical practices and superstitious and obscurantist attitudes only by educating the society. Mass media i.e. radio, television, newspapers, magazines, internet programmers, social sites, etc. can play a vital role in it, so programme should be framed and spread by use of media to target these practices.

***Q. 13. Though the law gives women equal status in India, many people hold unscientific views on a woman's innate nature, capacity and intelligence and in practice given them a secondary status and role. Demolish this view using scientific arguments and by quoting***





***examples of great women in science and other spheres; and persuade yourself and others that, given equal opportunity, women are on par with men. [NCERT Ex. Q. 1.13, Page 14]***

Ans. There is no difference in the capacity of the women in taking good and quick decisions, in doing hard work and intelligence. The development of human brain depends on the nutrition contents of prenatal and postnatal diet and it does not depend on the gender. Anything which can be achieved by a man can also be achieved by a woman. In every field of life, women have proved herself. Madam Curie, a Physicist, won Nobel prize. Mother Teresa was a great saint, Kalpana Chawla an astronaut, Mrs. Indira Gandhi, Margret Thatcher, Lata Mangeshkar etc., are well known personalities in different fields. Therefore, women should be given equal opportunity on par with men.

***Q. 14. "It is more important to have beauty in the equation of physics than to have them agree with experiments." The great British physicist P.A.M. Dirac held this view. Criticize this statement. Look out for some equations and results in this book which strike you as beautiful. [NCERT Ex. Q. 1.14, Page 14]***

Ans. It is a general feeling that physics is a dry subject and its main aim is to give quantitative and qualitative treatment, i.e., any derived relations or equations must be verified through experimentation. It is felt that truth of an equation is more important than the simplicity, wonderfulness, symmetry or beauty of the equation. We have some simple and beautiful equation in physics like  $E = mc^2$  (Energy of light)  $KE = \frac{1}{2} mv^2$  (kinetic energy of a moving particle)  $W = F.d$  (work done)  $V = IR$  (Ohm's law)

***Q. 15. Though the statement quoted above be disputed, most physicists do have a feeling that the great laws of physics are at once simple and beautiful. Some of the notable Physicists, besides Dirac, who have articulated this feeling are Einstein, Bohr, Heisenberg, Chandrasekhar and Feynman. You are urged to make special efforts to get access to the general books and writings by these and other great masters of physics. Their writings are truly inspiring ! Find out its value. [NCERT Ex. Q. 1.15, Page 14]***

Ans. It is absolutely true that great laws of physics are simple and beautiful. Few examples are given below :

- (i) Einstein's mass-energy equivalence relation  $E = mc^2$  is simple and beautiful.
- (ii) According to Max Planck's quantum theory, the energy of a photon is  $E = hf$ , is also a simple and useful equation.
- (iii) de-Broglie wavelength associated with a particle of mass  $m$  is given by  $\lambda = h/mv$ . It is also a simple and useful equation.

***Q. 16. Textbooks on science may give you a wrong impression that studying science is dry and too serious and that scientists are absent minded introverts who never laugh or grin. This image of science and scientists is patently false. Scientists like any other group of humans have their share of humorists and many have led their lives with a great sense of fun and adventure even as they seriously pursued their scientific work. Two great physicists of this generation are Gamow and Feynman. Find out its value. [NCERT Ex. Q. 1.16, Page 15]***



Ans. It is true that scientists like any other group of humans have their share of humorists. Two great physicists of this genre are Gamow and Feynman. Few other scientists whose name can be added in this list are CV Raman, Einstein, Bohr, former Indian president. APJ Abdul Kalam etc.