

CBSE test Paper 03
Chapter 1 Physical World

1. The major contribution of Paul Dirac was in
 - a. relativity theory
 - b. Relativistic theory of electron
 - c. photoelectric effect
 - d. Measurement of electronic charge
2. Universal law of gravitation does not explain
 - a. motion of planets around the sun
 - b. pendulums
 - c. bodies falling towards the earth
 - d. origin of gravitational attraction
3. The major contribution of S.N. Bose was in
 - a. Quantum statistics
 - b. Measurement of electronic charge
 - c. relativity theory
 - d. photoelectric effect
4. Which of the following is not a synonym of axiom
 - a. model
 - b. assumptions
 - c. basis
 - d. postulate
5. Validity of the conservation of momentum is
 - a. in only cases involving billiard balls
 - b. in only those domains where Newton's laws are valid
 - c. in all domains including domains where Newton's laws may not be valid

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- d. in only those domains where quantum laws are valid
6. Name the scientific principle behind the technology, 'nuclear reactor'.
 7. Give an example of achievement in unification.
 8. Who proposed the wave theory of light?
 9. Name the scientist and the country of his origin whose field of work was 'elasticity'.
 10. Name the phenomena / fields with which microscopic domain of physics deals. Which theory explains these phenomena?
 11. Briefly explain how physics is related to technology.
 12. What do you mean by mass energy equivalence? Give example.
 13. "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.
 14. Name five important discoveries of physics which have contributed a lot in the development of biological sciences.
 15. Name four fundamental forces in nature. Out of the four which one is
 - i. strongest?
 - ii. weakest?

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Answer

1. b. Relativistic theory of electron

Explanation: Paul Dirac was one of the greatest theoretical physicists in history. He completely reshaped quantum mechanics with the astounding Dirac Equation.

The Dirac Equation explained the behavior of electrons and foretold the existence of antimatter. Dirac was also able to infer the existence of vacuum polarization, revealing that what we once believed was empty space is actually awash with short-lived particle-antiparticle pairs.

2. d. origin of gravitational attraction

Explanation: Universal law of Gravitation explain the force of attraction between two bodies having mass and placed at a distance but it never explain how this force generated and what is the origin of this.

3. a. Quantum statistics

Explanation: Satyendra Nath Bose was an Indian physicist from Bengal specialising in theoretical physics. He is best known for his work on quantum mechanics in the early 1920s, providing the foundation for Bose–Einstein statistics and the theory of the Bose–Einstein condensate.

4. a. model

Explanation: An axiom or postulate is a statement/assumption that is taken to be true, to serve as a premise or starting or base point for further reasoning and arguments.

5. c. in all domains including domains where Newton's laws may not be valid

Explanation: The total linear momentum and the total angular momentum (both vectors) of an isolated system are also conserved quantities. These laws can be derived from Newton's laws of motion in mechanics. But their validity goes beyond mechanics. They are the basic conservation laws of nature in all

domains, even in those where Newton's laws may not be valid.

6. Nuclear reactors operate on the principle of controlled nuclear fission, the process in which a heavy atomic nucleus splits into two smaller fragments.
7. Terrestrial mechanics and Unified celestial showed that the same laws of motion and the law of gravitation apply to both domains.
8. Huygens
9. Robert Hooke, England
10. The microscopic domain of physics deals with the constitution and structure of matter at atomic and nuclear scale.
The quantum theory is currently accepted as the proper framework for explaining microscopic phenomena.
11. Progress in the field of science and technology is interrelated. Sometimes technology gives rise to new physics and at other times physics generated new technology. The discipline of thermodynamics arose mainly to understand and improve the working of heat engines. Similarly discovery of basic laws of electricity and magnetism led to development of wireless communication technology. Therefore, we can conclude that physics and technology are closely related.
12. Mass energy equivalence was propounded by Albert Einstein. It states that energy and mass are inter convertible.
Example: An e^- (electron) collides with an e^+ (positron) and the two annihilate giving two photons. The total mass of e^- and e^+ is converted into energy.
13. A common observation in our daily life is that light travels in straight line. When Huygens
Propounded his wave theory, it was against the accepted belief. However, soon it became a dogma as reflection, refraction etc., could be successfully explained on the basis of wave theory. When photoelectric effect was discovered then it was found that wave theory of light cannot explain the phenomena and we came to a conclusion that light truly has dual characteristic. It may behave both as wave and a particle.

We may consider other similar examples from the history of science.

14. The five important discoveries of physics which have contributed a lot in the development of biological sciences are:

- i. X-rays and neutron diffraction technique.
- ii. Electron microscope.
- iii. Radioisotopes.
- iv. Ultrasonic waves.
- v. Magnetic resonance-based imaging technique etc.

15. The four fundamental forces present in nature are:

- a. Electromagnetic Force
- b. Gravitational Force
- c. Strong Nuclear Force
- d. Weak Nuclear Force

Out of the four fundamental types of forces,

- i. The strong nuclear force is the strongest force
- ii. Gravitational force is the weakest force