



Government of Tamilnadu

Department of Employment and Training

Course : TNPSC Group II Exam
Subject : Physics
Topic : **General Scientific Laws**

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**Commissioner,
Department of Employment and Training.**

GENERAL SCIENTIFIC LAWS

1. Universal Gravitation (1666)

- ❖ Isaac Newton came to the conclusion that all objects in the universe, from apples to planets, exert gravitational attraction on each other.

2. Laws of Motion (1687)

- ❖ The relationship between an object's mass (m), its acceleration (a) and the applied force (F) is $F = ma$.
- ❖ For every action there is an equal and opposite reaction.

3. Electromagnetism (1807-1873)

- ❖ Pioneering experiments uncover the relationship between electricity and magnetism and lead to a set of equations that express the basic laws governing them.
- ❖ One of those experiments unexpectedly yield results in a classroom. In 1820
- ❖ Danish physicist Hans Christian Oersted was delivery his speech to the students about the possibility

that electricity and magnetism are related. During the lecture, an experiment demonstrated the velocity of his theory in front of the whole class.

4. Special Relativity (1905)

- ❖ Albert Einstein overthrew basic assumptions about time and space by describing how clocks tick slower and distances appear to stretch as objects approach the speed of light.

5. $E = mc^2$ (1905)

- ❖ Albert Einstein's famous formula proves that mass and energy are different manifestations of the same thing, and that a very small amount of mass can be converted into a very large amount of energy.
- ❖ One profound implication of his discovery is that no object with mass can ever go faster the speed of light

6. Quantum Leap (1900 -1935)

- ❖ To describe the behaviour of subatomic particles, a new set of

natural law was developed by Max Planck, Albert Einstein, Werner Heisenberg and Erwin Schrodinger.

- ❖ A quantum leap is defined as the change of an electron within an atom from one energy state to another. This change happens at once, not gradually.

7. Nature of Light (1704 - 1905)

- ❖ Thought and experimentation by Isaac Newton, Thomas young and Albert Einstein lead to an understanding of what light is, how it behaves and how it is transmitted.
- ❖ Newton used a prism to split white light into its constituent colours and another prism to mix the colours into white light, proving at coloured light mixed together makes white light.
- ❖ Young established that light is a wave and that wavelength determines colour.
- ❖ Finally, Einstein recognized that light always travels at a constant speed, no matter what is the speed of the measure.

Superconductors (1911-1986)

- ❖ The unexpected discovery that some materials have no resistance to the flow of electricity promises to revolutionize industry and technology.
- ❖ Superconductivity occurs in a wide variety of materials, including simple elements like tin and aluminium, various metallic alloys and certain ceramic compounds.

8. Quarks (1962)

- ❖ Murray Gell-Mann proposed the existence of fundamental particles that combine to form composite objects such as protons and neutrons.
- ❖ A quark has both an electric and a "strong" charge. Protons and neutrons each contain three quarks.

9. Nuclear Forces (1666-1957)

- ❖ Discoveries of the basic forces at work on the subatomic level lead to the realization that all interactions in the universe are the result of four fundamental forces of nature-the strong and weak nuclear forces, the electromagnetic force and gravitation.