



## **Government of Tamilnadu**

### **Department of Employment and Training**

Course : TNPSC Group II Exam

Subject : Physics

Topic : **Inventions and Discoveries**

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



# INVENTIONS AND DISCOVERIES

## DISCOVERIES

c500	BC Static electricity	Thales of Miletus, Greece
c240	BC How things float	Archimedes, Greece
c150	Earth-centred universe	Claudius Ptolemy, Greece
1304	Cause of rainbow	Nicolaus Copernicus, Poland
1600	Earth's magnetism	William Gilbert, England
1604	How objects fall	Galileo Galilei, Italy
1609	How the planets move	Johannes Kepler, Germany
1609	Moons of Jupiter	Galileo Galilei, Italy
1616	Chemical element defined	Robert Boyle, Ireland
1643	Air Pressure	Evangelista Torricelli, Italy
1662	Law of gases	Robert Boyle, Ireland
1666	Nature of white light	Isaac Newton, England
1666	Gravity	Isaac Newton, England
1687	Laws of motion	Isaac Newton, England
1690	Wave theory of light	Christian Huygens, Holland
1718	Fahrenheit temperature scale	Gabriel Fahrenheit, Germany
1742	Centigrade temperature scale	Anders Celsius, Sweden
1752	The nature of lightning	Benjamin Franklin, USA
1772	Nature of Combustion	Antonie Lavoisier, France
1774	Preparation of Oxygen	Joseph Priestley, England
1791	Metric system of Units	France
1798	Nature of heat	Count Rumford, England

## INVENSIONS AND DISCOVERIES

1800	Wave nature of light	Thomas Young, England
1800	Electric current	Alessandro Volta, Italy
1802	Atomic theory	John Dalton, England
1807	Discovery of new elements using electricity	Humphry Davy, England
1808	How gases combine	Joseph Gay-Lussac, France
1811	Molecules in gases	Amedeo Avogadro, Italy
1820	Electromagnetism	Hans Oersted, Denmark
1820	Force between current carrying wires	Andre Ampere, France
1827	Law of electric current	George Ohm, Germany
1831	Electromagnetic induction	Michael Faraday, England
1833	Laws of Electrolysis	Michael Faraday, England
1841	Heat and work	James Joule, England
1855	Prediction of radio-waves	James Maxwell, Scotland
1869	Periodic table of elements	Dimitri Mendeleev USSR
1887	Radio waves discovered	Heinrich Hertz, Germany
1887	Speed of light	Albert Michelson, USA
1894	Noble gases	William Ramsey, Scotland
1895	X-rays	Wilhelm Rontgen, Germany
1896	Radioactivity	Antoine Becquerel" France
1897	Electron	Joseph John Thomson, England
1898	Radium	Pierre and Marie Curie, France
1899	Alpha and Beta particles	Ernest Rutherford, New Zealand
1900	Quantum theory	Max Planck, Germany

1903	Theory of radioactivity	Ernest Rutherford (New Zealand) and Frederick Soddy (England)
1905	Relativity	Albert Einstein, Germany
1905	Photoelectric effect	Albert Einstein, Germany
1911	Atomic nucleus	Ernest Rutherford, New Zealand
1911	Superconductors	Heike Kammerlingh Onnes, Holland
1913	Structure of the atom	Niels Bohr, Denmark
1915	General relativity	Albert Einstein, Germany
1919	Proton Ernest	Rutherford, New Zealand
1926	Wave nature of matter	Erwin Schroedinger, Austria
1927	Uncertainty principle	Werner Heisenberg, Germany
1929	Expanding universe	Edwin Hubble, USA
1932	Neutron	James Chadwick, England
1938	Nuclear Fission	Otto Hahn, Germany
1939	Chemical bonding	Linus Pauling. USA
1964	Quark	Murray Gell-Mann, USA
1974	Black hole	Stephen Hawking, England
1984	Polymerase chain	Kary Mullis reaction
1986	High-temperature superconductors	Alex Muller (Switzerland) and George Bednorz (West Germany)

### INVENTIONS

c4000 BC	Wheel	Asia
c4000 BC	Weighing instruments	Mesopotamia
c3500 BC	Potters wheel	Mesopotamia
236 BC	Screw for lifting water	Archimedes, Greece
600 BC	Cast iron	China

## INVENTIONS AND DISCOVERIES

c1000	Gunpowder	China
1088	Water-powered clock	Han Kung-Lien, China
1267	Magnifying glass	Roger Bacon, England
1280	Spectacles	Sadi Popozo, Italy
c1450	Printing Press	Johannes Gutenberg, Germany
c1590	Microscope	Zacharias Janseen, Holland
c1593	Thermometer	Galileo Galilei, Italy
c1608	Lens telescope	Hans Lippershey, Holland
1642	Adding machine	Blaise Pascal, France
1643	Mercury barometer	Evangelista Torricelli, Italy
1657	Pendulum clock	Christiaan Huygens, Holland
1668	Reflecting telescope	Issac Newton, England
1674	Calculating machine	Gottfried von Leibniz. Germany
1698	Steam engine	Thomas Savery, England
1764	Spinning machine	James Hargreaves, Eng and
1712	Steam-driven pump	Thomas Newcomen, England
1733	Mechanical loom	John Kay, England
1752	Lightening conductor	Benjamin Franklin, USA
1769	Efficient steam engine	James Watt, England
1769	Steam-driven carriage	Nicolas Cugnot, France
1775	Submarine	David Bushnell, USA
1786	Steam boat	John Fitch USA
1783	Hot-air Balloon	Etienne and Joseph Montgolfier, France
1800	Electric battery	Alessandro Volta, Italy
1803	Steam train	Richard Trevithick, England
1820	Electromagnet	Hans Oersted, Denmark
1822	Photograph	Josephe Niepce, France

1831	Transformer	Michael Faraday, England
1831	Dynamo	Michael Faraday, England
1831	Electric motor	Michael Faraday, England
1835	Photographic negative	William Fox Talbot, England
1837	Electric telegraph	William Cooke and Charles Wheatstone (England)
1838	Morse code	Samuel Morse, USA
1839	Bicycle	Kirkpatrick Macmillan, Scotland
1843	Aneroid barometer	Lucien Vidi, France
1843	Iron-pulled ship	Isambard Brunei,
1843	Analytical engine	Charles Babbage, England
1852	Steam-powered airship	Henri Giffard, France
1856	Steel furnace	Henry Bessemer, England
1856	Synthetic dyes	William Perkin, England
1859	Spectroscope	Gutav Kirchoff and Robert Bunsen, Germany
1860	Gas-burning engine	Etienne Lenoir, Belgium
1862	Plastics	Alexander Parkes, England
1866	Dry cell battery	Georges Leclanche, France
1867	Dynamite	Alfred Nobel, Sweden
1876	Telephone	Alexander Graham Bell, USA
1876	Four-stroke gas engine	Nikolaus Otto
1877	Phonograph	Thomas Edison, USA
1879	Electric Light	Thomas Edison, USA
1879	Refrigerator	Karl Von Linde, Germany
1882	Sewing machine	Waiter Hunt, USA
1883	Petrol engine	Gottlieb Daimler, Germany
1884	Steam turbine	Charles Parsons, England

## INVENTIONS AND DISCOVERIES

1885	Motorcycle	Gottlieb Daimler, Germany
1885	Motor car	Karl Benz, Germany
1888	Pneumatic cycle tyre	John Dunlop, Scotland
1889	Telephone exchange	Almon Strowger, USA
1891	Moving pictures	Thomas Edison, USA
1891	Electrical storage-battery	Gaston Plant, France
1892	Oil-burning engine	Rudolf Diesel, Germany
1894	Radio transmitter	Guglielmo Marconi, Italy
1897	Cathode-ray tube	Ferdinand Braun, Germany
1898	Tape recorder	Valdemar Poulsen, Denmark
1900	Hydrofoil boat	E. Forlanini, Italy
1903	Aeroplane	Wilbur and Orville Wright, USA
1904	Diode valve	John Ambrose Fleming, England
1907	Helicopter	Paul Cornu, France
1908	Geiger counter	Hans Geiger, Germany
1918	Sonar	Paul Lengevin, France
1925	Television	John Logie Baird, Scotland
1926	Liquid-fuelled rocket	Robert Goddard, USA
1930	Jet engine	Frank Whittle, England
1931	Electron microscope	Max Knoll and Ernst Ruska, Germany
1931	Cyclotron	Ernest Lawrence, USA
1935	Nylon	Wallace Carothers, USA
1935	Radar	Robert Watson-Watt, England
1937	Radio telescope	Grote Reber, USA
1938	Scanning electron microscope	M.Von Ardenne, Germany
1942	Nuclear reactor	Enrico Fermi, USA



1947	Transistor	John Bardeen, William Shockley and Walter Brattain, USA
1947	Instant Camera	Edwin Land, USA
1948	Computer	Fredric Williams and Tom Kilburn, England
1948	Hologram	Denis Gabor, Hungary
1949	Rotary engine	Felix Wankel, Germany
1954	Communication satellite	Arthur Clarke, England
1955	Ultrasound scanning	I. Donald, England
1956	Video recorder	A. Poniatoff, USA
1957	First artificial satellite	USSR
1958	Integrated circuit	Jack Kilby, USA
1960	Laser	Theodore Maiman, USA
1961	First man in space	Yuri Gagarin, USSR
1962	First communication satellite launched	USA
1966	Optical fibres	K. Kao and G. Hockham, England
1969	First men on Moon	Neil Armstrong and Edwin Aldrin, USA
1971	Microprocessor	Ted Hoff, USA
1971	First space station	USSR
1981	Space Shuttle	USA
1980	Hepatitis B	Baruch
	Vaccine invented	Blumberg (USA)
1981	MS-DOS invented 1st IBM-PC invented scanning tunneling microscope	Tim Paterson and Gary Kindall (USA) Gerd Karl Binnig and Heinrich Rohrer
1985	Windows Program	Microsoft USA

1991	WWW (World Wide Web)	Tim Berner Lee
2001	iPod Self contained artificial Heart	Tony Fadell (USA) Alain F. Carpentier,
2005	You Tube - The online Video Sharing Community	Steve Chen, Chad and Jawed Karim
2008	Large Hadron Collider	CERN French-Swiss border

## **NOBEL PRIZE IN PHYSICS**

### **Year 2016**

1. David J. Thouless
2. F. Duncan M. Haldane
3. John. M. Kosterlitz

☞ For theoretical discoveries of topological phase transitions and topological phase of matter.

### **Year 2015**

1. Takaaki kajita
2. Arthuv B. Mc Donald

☞ For the discovery of neutrino oscillations, which shows that neutrinos have mass.

### **Year 2014**

1. Isamu Akasaki
2. Hiroshi Amano Shuji Nakamuva

☞ For the invention of efficient blue light – emitting diodes which has enabled bright and energy saving white light sources.

### **Year 2013**

1. Francois Englert, Perter W.Higgs

☞ For the theoretical discovery of a mechanism that contributes to our understanding of the origin of mass of subatomic particles and which recently was confirmed through the discovery of the ATLAS and CMS experiments at CERN's large Hadron collider.

### Year 2012

1. Serge Haroche, David J. Wineland

☞ For ground breaking experimented methods that enable measuring and manipulation of individual quantum systems.

### Year 2011

1. Saul Perlmutter, Brian P. Schmidt, Adam G. Riess

☞ For the discovery of the accelerating expansion of the universe through observation of distant supernovae.

**Neutrino oscillation** : It is a quantum mechanical phenomenon where by a neutrino created with a specific lepton flavour (electron Muon, or tau) can later be measured to have a different flavour.

### FAMOUS SCIENTISTS AND THEIR CONTRIBUTIONS

Names	Major Contributions/Discoveries	Country of Origin
Isaac Newton	Universal Law of gravitation; Laws of Motion; Reflecting Telescope	U.K.
Galileo Galilei	Law of inertia	Italy
Archimedes	Principle of Buoyancy; Principle of the lever	Greece
James Clerk Maxwell	Electromagnetic theory; Light-and electromagnetic wave	U.K.
W.K. Roentgen	X-rays	Germany
Marie Sklodowska Curie	Discovery of Radium and Polonium; Studies on natural radioactivity	Poland

Albert Einstein	Law of Photoelectricity; Theory of Relativity	Germany
S.N. Bose	Quantum Statistics	India
James Chadwick	Neutron	U.K.
Niels Bohr	Quantum Model of Hydrogen atom	Denmark
Ernest Rutherford	Nuclear model of atom	Denmark
C.V. Raman	Inelastic scattering of light by molecules	India
Christian Huygens	Wave theory of light	Holland
Michael Faraday	Laws of Electromagnetic Induction	U.K.
Edwin Hubble	Expanding Universe	U.S.A.
Homi Jehangir Bhabha	Cascade process in cosmic radiation	India
Abdus Salam	Unification of weak and electromagnetic interactions	Pakistan
RA Millikan	Measurement of electronic charge	U.S.A.
Ernest Orlando Lawrence	Cyclotron	U.S.A.
Wolfgang Pauli	Quantum Exclusion Principles	Austria
Louis victor de Broglie	Wave nature of matter	France
J.J. Thomson	Electron	U.K.
S. Chandrasekhar	Chandrasekhar limit, structure and evolution of stars	India
Lev Davidovich Landau	Theory of Condensed Matter; Liquid Helium	Russia
Heinrich Rudolf Hertz	Electromagnetic waves	Germany

J.c. Bose	Ultra short radio waves	India
Hideki Yukawa	Theory of Nuclear Forces	Japan
Werner Heisenberg	Quantum Mechanics; Uncertainty Principle	Germany
Victor Francis Hess	Cosmic Radiation	Austria
M.N. Saha	Thermal Ionization	India
G.N. Ramachandran	Triple Helical Structure of Proteins	India

### LINK BETWEEN TECHNOLOGY AND PHYSICS

Technologies	Scientific Principle(s)
Steam engine	Laws of Thermodynamics
Nuclear reactor	Nuclear fission
Radio and Television	Propagation of electromagnetic waves
Computers	Digital logic
lasers	Light amplification by stimulated emission of radiation (population inversion)
Production of ultra high magnetic fields	Superconductivity
Rocket propulsion	Newton's (2nd and 3rd) laws of motion
Electric generator	Faraday's laws of electromagnetic induction
Hydroelectric power	Conversion of gravitational potential energy into electrical energy
Aeroplane	Bernoulli's principle in fluid dynamics
Particle accelerators	Motion of charged particles in electromagnetic

	fields
SONAR	Reflection of ultrasonic waves

### FUNDAMENTAL FORCES OF NATURE

Forces	Relative Strength	Ranges	Operates Among
Gravitational force	$10^{-38}$	Infinite	All objects in the universe (Gravitation)
Weak nuclear force	$10^{-13}$	Very short, within nuclear size ( $\sim 10^{-15}$ m)	Bosons
Electromagnetic force	$10^{-2}$	Infinite	Photons
Strong nuclear force	1	Very short, within nuclear size ( $\sim 10^{-15}$ m)	Mesons

### ATOMIC INDUSTRIAL ORGANISATION

Heavy water board (HWB)	Mumbai
Nuclear fuel complex (NFC)	Hyderabad
Board of radiation & isotope technology (BRIT)	Mumbai

### ATOMIC PUBLIC SECTORS

Nuclear power corporation of India limited (NPCIL)	Mumbai
Uranium corporation of India Limited (UCIL)	Jharkhand
Indian rare earth limited (IRE)	Mumbai
Electronics corporation of India limited (ECIL)	Hyderabad

**AUTONOMOUS NATIONAL INSTITUTES**

Tata institute of fundamental physics (TIFR)	Mumbai
Tata memorial centre (TMC)	Mumbai
Saha institute of Nuclear physics (SINP)	Kolkata
Institute of physics (IOP)	Bhubaneswar
Harish Chandra research institute (HRI)	Allahabad
Institute of Mathematical sciences (IMSS)	Chennai
Institute for plasma research (IPR)	Ahmedabad

