EXPLANATIONS

1. (2) An optical fiber (or optical fibre) is a flexible, transparent fiber made of glass (silica) or plastic, slightly thicker than a human hair. It functions as a waveguide, or "light pipe", to transmit light between the two ends of the fiber. The field of applied science and engineering concerned with the design and application of optical fibers is known as fiber optics. Optical fibers are widely used in fiber-optic communications, which permits transmission over longer distances and at higher bandwidths (data rates) than other forms of communication. Narinder Singh Kapany is an Indian born American physicist who invented optical fibre.

2. (4) Radar is an object detection system which uses radio waves to determine the range, altitude, direction, or speed of objects. It can be used to detect aircraft, ships, spacecraft, guided missiles, motor vehicles, weather formations, and terrain. The radar dish or antenna transmits pulses of radio waves or microwaves which bounce off any object in their path. In 1922 A. Hoyt Taylor and Leo C. Young, researchers working with the U.S. Navy invented Radar.

3. (4) An automobile, motor car or car is a wheeled motor vehicle used for transporting passengers, which also carries its own engine or motor. The term motorcar has also been used in the context of electrified rail systems to denote a car which functions as a small locomotive but also provides space for passengers and baggage. Although several other German engineers (including Gottlieb Daimler, Wilhelm Maybach, and Siegfried Marcus) were working on the problem at about the same time, Karl Benz generally is acknowledged as the inventor of the modern automobile. In 1879, Benz was granted a patent for his first engine, which had been designed in 1878. Many of his other inventions made the use of the internal combustion engine feasible for powering a vehicle.

4. (4) Vinod Dham is an inventor, entrepreneur and venture capitalist. He is popularly known as the Father of the Pentium chip, for his contribution to the development of highly successful Pentium Processors from Intel. He is a mentor, advisor and investor; and sits on the boards of many companies including promising startups funded through his India based fund – Indo US Venture Partners, where he is the founding Managing Director.

5. (2) A videotape is a recording of images and sounds on to magnetic tape as opposed to film stock used in filmmaking or random access digital media. Videotapes are also used for storing scientific or medical data, such as the data produced by an electrocardiogram. Charles P. Ginsburg invented the videotape. He worked for Ampex, and was inspired by the reel-to-reel machines used for recording sound.

6. (3) A laser is a device that emits light (electromagnetic radiation) through a process of optical amplification based on the stimulated emission of photons. On May 16, 1960, Theodore H. Maiman operated the first functioning laser, at Hughes Research Laboratories, Malibu, California, ahead of several research teams, including those of Townes, at Columbia University, Arthur Schawlow, at Bell Labs, and Gould, at the TRG (Technical Research Group) company.

7. (1) There are many claimants to the title of the first company to produce practical transistor radios, often it is attributed to Sony (originally Tokyo Telecommunications Engineering Corporation). A transistor radio is a small portable radio receiver that uses transistor-based circuitry. Following their development in 1954 they became the most popular electronic communication device in history, with billions manufactured during the 1960s and 1970s. Their pocket size sparked a change in popular music listening habits, allowing people to listen to music anywhere they went.

8. (2) The oral polio vaccine (OPV) was developed in 1961 by Albert Sabin. Also called "trivalent oral polio vaccine" or "Sabin vaccine", OPV consists of a mixture of live, attenuated (weakened) poliovirus strains of all three poliovirus types. OPV produces antibodies in the blood to all three types of poliovirus. In the event of infection, these antibodies protect against paralysis by preventing the spread of wild poliovirus to the nervous system.

9. (1) Voice-mail (also known as voicemail, voice message or voice bank) is a computer based system that allows users and subscribers to exchange personal voice messages; to select and deliver voice information; and to process transactions relating to individuals, organizations, products and services, using an ordinary telephone. Voicemail systems were developed in the late 70's by Voice Message Exchange (VMX). They became popular in the early 80's when they were made available on PC-based boards. Voice mail was the brainchild of Gordon Mathews, a successful entrepreneur who held 35 US and foreign patents at the time of his death on February 23, 2002.

10. (4) Martin Cooper (born December 26, 1928 in Chicago, Illinois, USA) is an American former Motorola vice president and division manager who in the 1970s led the team that developed the handheld mobile phone (as distinct from the car phone). Cooper was also the CEO and founder of ArrayComm, a company that works on smart antenna technology and wireless networks, and was the corporate director of Research and Development for Motorola. In 1973, when Motorola installed a base station to handle the first public demonstration of a phone call over the cellular network, the company was trying to persuade the Federal Communications Commission to allocate frequency space to private companies for use in the emerging technology of cellular communications. After some initial testing in Washington for the F.C.C., John F. Mitchell and his team, which included Martin Cooper, took the cellular phone technology to New York to demonstrate it to reporters and the public.

11. (1) John Logy Baird demonstrated first television on 26 January, 1926, Alexander Fleming discovered penicillin in 1928, Telecast of talking pictures on television by BBC took place on 2 July, 1967, Jonas E. Salk developed first polio vaccine in 1952. John Logie Baird was born on 14 August, 1888 in Helensburgh on the west coast of Scotland, the son of a clergyman. In 1929, the German post office gave him the facilities to develop an experimental television service based on his mechanical system, the only

one operable at the time. Sound and vision were initially sent alternately, and only began to be transmitted simultaneously from 1930.

12. (2) Euclid, also known as Euclid of Alexandria, was a Greek mathematician, often referred to as the "Father of Geometry". He was active in Alexandria during the reign of Ptolemy I (323–283 BC). Euclid deduced the principles of what is now called Euclidean geometry from a small set of axioms. Euclid also wrote works on perspective, conic sections, spherical geometry, number theory and rigor. Although many of the results in Elements originated with earlier mathematicians, one of Euclid's accomplishments was to present them in a single, logically coherent framework, making it easy to use and easy to reference, including a system of rigorous mathematical proofs that remains the basis of mathematics 23 centuries later.

13. (3) Astronomers have discovered a new planetoid at the far edge of our Solar System. The new object, named Sedna, is probably almost as big as the smallest planet, Pluto. Sedna is very, very far away. It is more than twice as far from the Sun as Pluto, and about 90 times as far from the Sun as Earth. Sedna is probably a huge ball of ice. The ice is reddish in color. There are probably chemicals in the ice that make it red. Sedna orbits the Sun once every 10,500 years. Its orbit takes it out to about 900 times as far from the Sun as the Earth.

14. (1) Christian Neethling Barnard was a South African cardiac surgeon who performed the world's first successful human-to-human heart transplant. Following the first successful kidney transplant in 1953, in the United States, Barnard performed the first kidney transplant in South Africa in October 1967. Barnard experimented for several years with animal heart transplants. More than 50 dogs received transplanted hearts. He performed the world's first human heart transplant operation on 3 December 1967, in an operation assisted by his brother, Marius Barnard; the operation lasted nine hours and used a team of thirty people.

15. (4) Radar is an object detection system which uses radio waves to determine the range, altitude, direction, or speed of objects. It can be used to detect aircraft, ships, spacecraft, guided missiles, motor vehicles, weather formations, and terrain. The radar dish or antenna transmits pulses of radio waves or microwaves which bounce off any object in their path. In 1922 A. Hoyt Taylor and Leo C. Young, researchers working with the U.S. Navy invented Radar.

16. (2) An automobile is a wheeled motor vehicle used for transporting passengers, which also carries its own engine or motor. The term motorcar has also been used in the context of electrified rail systems to denote a car which functions as a small locomotive but also provides space for passengers and baggage. Although several other German engineers (including Gottlieb Daimler, Wilhelm Maybach, and Siegfried Marcus) were working on the problem at about the same time, Karl Benz generally is acknowledged as the inventor of the modern automobile.

17. (2) The invention of the first automatic car is more evolutionary than the result of a single invention. Frenchmen Louis-Rene Panhard and Emile Levassor are recognized for inventing the modern transmission in 1894, but it was Thomas J. Sturtevant of Boston, Mass., who designed the first automatic transmission in 1904. In 1938, General Motors developed the first line of cars to sport automatic transmission — Oldsmobiles that offered "Hydra-Matic drive." The cars were introduced to the public in 1940. In 1941, Chrysler followed suit and introduced three different cars that offered their version of automatic drive, "Vacamatic" (later called "Fluid Drive"). Automatic transmission was a fairly common option on most American cars by 1948. Ford-O-Matic was the first automatic transmission widely used by Ford Motor Company.

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19. (2) An optical fiber (or optical fibre) is a flexible, transparent fiber made of glass (silica) or plastic, slightly thicker than a human hair. It functions as a waveguide, or "light pipe", to transmit light between the two ends of the fiber. The field of applied science and engineering concerned with the design and application of optical fibers is known as fiber optics. Optical fibers are widely used in fiber-optic communications, which permits transmission over longer distances and at higher bandwidths (data rates) than other forms of communication. Narinder Singh Kapany (born 31 October 1926 in Moga, Punjab, India) is an Indian born American physicist invented optical fibre.

20. (2) A videotape is a recording of images and sounds on to magnetic tape as opposed to film stock used in filmmaking or random access digital media. Videotapes are also used for storing scientific or medical data, such as the data produced by an electrocardiogram. Charles P. Ginsburg invented the videotape. He worked for Ampex, and was inspired by the reel-to-reel machines used for recording sound.

21. (3) The electron is a subatomic particle with a negative elementary electric charge. An electron has a mass that is approximately 1/1836 that of the proton. The intrinsic angular momentum (spin) of the electron is a half-integer value in units of h, which means that it is a fermion. Like all matter, they have quantum mechanical properties of both particles and waves, so they can collide with other particles and can be diffracted like light. The electron was identified as a particle in 1897 by J. J. Thomson and his team of British physicists.

22. (3) In electronics, a vacuum tube, thermionic valve, tube, or valve is a device controlling electric current through a vacuum in a sealed container. The container is often thin transparent glass in a roughly cylindrical shape. Sir John Ambrose Fleming (29 November 1849

– 18 April 1945) was an English electrical engineer and physicist. He is known for inventing the first thermionic valve or vacuum tube, the diode, then called the kenotron in 1904. He is also famous for the left hand rule (for electric motors).

23. (1) Gunpowder was the first chemical explosive and the only one known until the invention of nitrocellulose, nitroglycerin, smokeless powder, and TNT in the second half of the 19th century. Prior to the invention of gunpowder, many incendiary and burning devices had been used, including Greek fire. Roger Bacon invented gunpowder.

24. (1) Otto Hahn, (8 March 1879 – 28 July 1968) was a German chemist and Nobel laureate, a pioneer in the fields of radioactivity and radiochemistry. He is regarded as "the father of nuclear chemistry". Hahn was a courageous opposer of Jewish persecution by the Nazi Party and after World War II he became a passionate campaigner against the use of nuclear energy as a weapon. He served as the last President of the Kaiser Wilhelm Society (KWG) in 1946 and as the founding President of the Max Planck Society (MPG) from 1948 to 1960. He is famous for invention of atomic bomb.

25. (1) Mycobacteriumleprae, the causative agent of leprosy, was discovered by G. H. Armauer Hansen in Norway in 1873. Hansen observed a number of nonrefractile small rods in unstained tissue sections. The rods were not soluble in potassium lye, and they were acid- and alcohol-fast. In 1879, he was able to stain these organisms with Ziehl's method and the similarities with Koch's bacillus (Mycobacterium tuberculosis) were noted.

26. (2) X-radiation (composed of X-rays) is a form of electromagnetic radiation. X-rays have a wavelength in the range of 0.01 to 10 nanometers, corresponding to frequencies in the range 30 petahertz to 30 exahertz (3×10^{16} Hz to 3×10^{19} Hz) and energies in the range 100 eV to 100 keV. They are shorter in wavelength than UV rays and longer than gamma rays. In many languages, X-radiation is called Röntgen radiation, after Wilhelm Röntgen, who is usually credited as its discoverer, and who had named it X-radiation to signify an unknown type of radiation.

27. (3) Cement is a binder, a substance that sets and hardens independently, and can bind other materials together. The word "cement" traces to the Romans, who used the term opus caementicium to describe masonry resembling modern concrete that was made from crushed rock with burnt lime as binder. Joseph Aspdin was a British cement manufacturer who obtained the patent for Portland cement on 21 October 1824.

28. (2) The North Pole is the northernmost point on the Earth, lying diametrically opposite the South Pole. It defines geodetic latitude 90° North as well as the direction of true north. At the North Pole all directions point south; all lines of longitude converge there, so its longitude can be defined as any degree value. Robert Edwin Peary was an American explorer who claimed to have led the first expedition, on April 6, 1909, to reach the geographic North Pole.

29. (1) Van Leeuwenhoek discovered "protozoa" - the single-celled organisms and he called them "animalcules". He also improved the microscope and laid foundation for microbiology. He is often cited as the first microbiologist to study muscle fibers, bacteria, spermatozoa and blood flow in capillaries. Although, he did not have much education or a scientific background, yet he defied all odds to be reckoned as a great scientist through his skillful observations, insight and unmatched curiosity. He revolutionized biological science by exposing microscopic life to the world.

30. (2) The electron microscope was invented by Max Knoll and Ernst Ruska in 1931 (Germany). An electron microscope uses condensing lenses to focus a beam of electrons to illuminate a specimen and produce a magnified image. An electron microscope (EM) has greater resolving power than a light-powered optical microscope because electrons have wavelengths about 100,000 times shorter than visible light photons. The electron microscope uses electrostatic and electromagnetic "lenses" to control the electron beam and focus it to form an image. These lenses are analogous to but different from the glass lenses of an optical microscope that forms a magnified image by focusing light on or through the specimen.

31. (1) The discovery of penicillin is attributed to Scottish scientist and Nobel laureate Alexander Fleming in 1928. Penicillin is a secondary metabolite of certain species of Penicillium and is produced when growth of the fungus is inhibited by stress. It is not produced during active growth.

32. (3) The smallpox vaccine was the first successful vaccine to be developed. The process of vaccination was first publicised by Edward Jenner in 1796, who acted upon his observation that milkmaids who caught the cowpox virus did not catch smallpox. Before the introduction of a vaccine, the mortality of the severe form of smallpox—variola major—was very high. Historical records show that a method of inducing immunity was already known. A process called inoculation, also known as insufflation or variolation was practiced in India as early as 1000 BC.

33. (2) Dr. Hans von Ohain and Sir Frank Whittle are both recognized as being the co-inventors of the jet engine. Each worked separately and knew nothing of the other's work. Hans von Ohain is considered the designer of the first operational turbojet engine. Frank Whittle was the first to register a patent for the turbojet engine in 1930. Hans von Ohain was granted a patent for his turbojet engine in 1936. However, Hans von Ohain's jet was the first to fly in 1939. Frank Whittle's jet first flew in 1941.

34. (2) X-radiation (composed of X-rays) is a form of electromagnetic radiation. X-rays have a wavelength in the range of 0.01 to 10 nanometers, corresponding to frequencies in the range 30 petahertz to 30 exahertz (3×10^{16} Hz to 3×10^{19} Hz) and energies in the range 100 eV to 100 keV. They are shorter in wavelength than UV rays and longer than gamma rays. In many languages, X-radiation is called Röntgen radiation, after Wilhelm Röntgen, who is usually credited as its discoverer, and who had named it X-radiation to signify an unknown type of radiation.

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36. (1) Sir James Young Simpson was a Scottish and an important figure in the history of medicine. Simpson discovered the anaesthetic properties of chloroform and successfully introduced it for general medical use. Chloroform is an organic compound with formula CHCl3. It is one of the four chloromethanes. The colorless, sweet-smelling, dense liquid is a trihalomethane, and is considered somewhat hazardous. Several million tons are produced annually as a precursor to Teflon and refrigerants, but its use for refrigerants is being phased out.

37. (2) In the 1870s, two inventors Elisha Gray and Alexander Graham Bell both independently designed devices that could transmit speech electrically (the telephone). Both men rushed their respective designs to the patent office within hours of each other; Alexander Graham Bell patented his telephone first. Elisha Gray and Alexander Graham Bell entered into a famous legal battle over the invention of the telephone, which Bell won.

38. (4) Edward Taylor was a Hungarian-American theoretical physicist, known colloquially as "the father of the hydrogen bomb." Taylor made numerous contributions to nuclear and molecular physics, spectroscopy (the Jahn–Taylor and Renner–Taylor effects), and surface physics.

39. (2) The Lumière brothers, Auguste Marie Louis and Louis Jean were the earliest filmmakers in history. The Lumières held their first private screening of projected motion pictures in 1895. Their first public screening of films at which admission was charged was held on December 28, 1895, at Salon Indien du Grand Café in Paris.

40. (3) Joseph Aspdin, a British bricklayer from Leeds, is considered to be the originator of Portland cement. A process for the manufacture of Portland cement was patented in 1824. This cement was an artificial cement similar in properties to the material known as "Roman cement." Aspdin's process was similar to a process patented in 1822 and used since 1811 by James Frost who called his cement "British Cement".

41. (4) A hygrometer is an instrument used for measuring the moisture content in the environment. Humidity measurement instruments usually rely on measurements of some other quantity such as temperature, pressure, mass or a mechanical or electrical change in a substance as moisture is absorbed.

42. (3) Charles Babbage was an English mathematician, philosopher, inventor and mechanical engineer who originated the concept of a programmable computer. Considered a "father of the computer", Babbage is credited with inventing the first mechanical computer that eventually led to more complex designs.

43. (2) Tim Berners-Lee is a British computer scientist and the inventor of the World Wide Web. He made a proposal for an information management system in March, 1989, and on 25 December, 1990, with the help of Robert Cailliau and a young student at the European Organization for Nuclear Research (CERN), he implemented the first successful communication between a Hypertext Transfer Protocol (HTTP) client and server via the Internet.

44. (1) Mosaic is the web browser credited with popularizing the World Wide Web. Marc Andreessen is best known as co-author of Mosaic, the first widely used Web browser. He is one of only six inductees in the World Wide Web Hall of Fame announced at the first international conference on the World Wide Web in 1994.

45. (1) Wallace Hume Carothers was an American chemist, inventor and the leader of organic chemistry at DuPont, credited with the invention of nylon. He was a group leader at the DuPont Experimental Station laboratory, near Wilmington, Delaware, where most polymer research was done.

46. (2) William Ferrel was an American meteorologist, developed theories which explained the mid-latitude atmospheric circulation cell in detail. He demonstrated that it is the tendency of rising warm air, as it rotates due to the Coriolis effect, to pull in air from more southerly, warmer regions and transport it poleward. It is this rotation which creates the complex curvatures in the frontal systems separating the cooler Arctic air to the north from the warmer continental tropical air to the south.

47. (1) The Analytical Engine was a proposed mechanical general-purpose computer designed by English mathematician Charles Babbage. It was first described in 1837 as the successor to Babbage's Difference Engine, a design for a mechanical computer. The Analytical Engine incorporated an arithmetic logic unit, control flow in the form of conditional branching and loops, and integrated memory, making it the first design for a general-purpose computer that could be described in modern terms as Turing-complete.

48. (1) Frederick Banting was a Canadian medical scientist, doctor and Nobel laureate noted as one of the main discoverers of insulin. In 1923 Banting and John James Rickard Macleod received the Nobel Prize in Medicine, becoming the youngest recipient of the Nobel Prize in Physiology/Medicine till date.

49. (3) Nicolaus Copernicus discovered the Solar System. He was the first astronomer who formulated a comprehensive heliocentric cosmology in his book "De Revolutionibus Orbium Coelestium" (On the Revolutions of the Celestial Spheres), which displaced the Earth from the center of the universe.

50. (1) Robert Edwin Peary, Sr. was an American explorer who claimed to have led the first expedition, on April 6, 1909, to reach the geographic North Pole. Peary's claim was widely credited for most of the 20th century, though it was criticized even in its own day.

51. (2) The Gyroplane Laboratoire was an early helicopter. Its designer, Frenchman Louis Breguet, had already experimented with rotorcraft in 1909, however, he chose to concentrate on airplanes until the end of the 1920s. In 1929 he announced a set of patents which addressed the flight stabilization of rotorcraft, and, in 1931, Breguet created the Syndicat d'Etudes de Gyroplane.

52. (3) Alexander Fleming was a Scottish biologist, pharmacologist and botanist. His best-known

discoveries are the enzyme lysozyme in 1923 and the antibiotic substance penicillin from the mould Penicillium notatum in 1928, for which he shared the Nobel Prize in Physiology or Medicine in 1945 with Howard Florey and Ernst Boris Chain.

53. (1) The Wright brothers, Orville and Wilbur, were two American brothers, inventors, and aviation pioneers who were credited with inventing and building the world's first successful airplane and making the first controlled, powered and sustained heavier-than-air human flight, on December 17, 1903. In the two years afterward, the brothers developed their flying machine into the first practical fixed-wing aircraft.

54. (3) Alexander Fleming discovered the antibiotic substance penicillin from the mould Penicillium notatum in 1928, for which he shared the Nobel Prize in Physiology or Medicine in 1945.

55. (3) Acquired Immunodeficiency Syndrome (AIDS) was first reported in 1981 in San Francisco and New York. However, it was in 1983-84 that the causative virus was isolated from patients of AIDS and was named HIV in 1986.

56. (3) A theory of electromagnetism was developed by various physicists over the course of the 19th century, culminating in the work of James Clerk Maxwell, who unified the preceding developments into a single theory and discovered the electromagnetic nature of light. In classical electromagnetism, the electromagnetic field obeys a set of equations known as Maxwell's equations.

57. (3) The distribution of energy in the spectrum of radiations of a hot body cannot be explained by applying the classical concepts of physics. Max Planck gave an explanation to this observation by his Quantum Theory of Radiation.

58. (1) The theory that gases in the atmosphere might increase Planet Earth's temperature was first postulated by Joseph Fourier in 1827, a scientist who also seems to have coined the term "greenhouse gases." But it wasn't until 1896 that a research chemist by the name of Svante Arrhenius quantified the greenhouse gas theory and apparently coined the term "greenhouse effect."

59. (2) The ABO blood group system is widely credited to have been discovered by the Austrian scientist Karl Landsteiner, who found three different blood types in 1900; he was awarded the Nobel Prize in Physiology or Medicine in 1930 for his work.

60. (1) The concept of stored-program seals with storage of instructions in computer memory to enable it to perform a variety of tasks in sequence or intermittently. The idea was introduced in the late 1940s by John von Neumann.

61. (2) Meteorology is the scientific study of the atmosphere or weather. Meteorological phenomena are observable weather events which are explained by the science of meteorology. Those events are bound by the variables that exist in Earth's atmosphere; temperature, air pressure, water vapor, etc.

62. (2) Lactometer is used to check purity of milk. The specific gravity of milk does not give a conclusive indication of its composition since milk contains a variety of substances that are either heavier or lighter than water. The device works on the principle of Archimedes's principle that a solid suspended in a fluid will be buoyed up by a force equal to the weight of the fluid displaced.

63. (2) Antoine Henri Becquerel, a French physicist, was the discoverer of radioactivity along with Marie Sklodowska-Curie and Pierre Curie, for which all three won the 1903 Nobel Prize in Physics. Radioactivity refers to the particles which are emitted from nuclei as a result of nuclear instability.

64. (3) Pharmacology is the study of drugs. It involves examining the interactions of chemical substances with living systems, with a view to understanding the properties of drugs and their actions, including the interactions between drug molecules and drug receptors and how these interactions elicit an effect.

65. (4) Root pressure is measured by an instrument called an auxanometer. The auxanometer measures plant growth as well as the pressure developed within the xylem cells of roots.

66. (1) The ABO blood group system is widely credited to have been discovered by the Austrian scientist Karl Landsteiner, who identified the O, A, and B blood types in 1900. He was awarded the Nobel Prize in Physiology or Medicine in 1930 for his work.

67. (2) A tachometer is an instrument measuring the rotation speed of a shaft or disk, as in a motor or other machine. The device usually displays the revolutions per minute (RPM).

68. (1) Radium, in the form of radium chloride, was discovered by Marie Curie and Pierre Curie in 1898. They extracted the radium compound from uraninite. In nature, radium is found in uranium ores in trace amounts as small as a seventh of a gram per ton of uraninite.

69. (3) A crescograph is a device for measuring growth in plants. It was invented in the early 20th century by Sir Jagadish Chandra Bose - an Indian polymath, physicist, biologist, botanist, and archaeologist.

70. (3) Ethology is the scientific and objective study of animal behavior, usually with a focus on behavior under natural conditions. The term was first popularized by American myrmecologist (the study of ants) William Morton Wheeler in 1902.

71. (1) Along with the surgeon Patrick Steptoe, Robert Edwards successfully pioneered conception through IVF, which led to the birth of Louise Brown in 1978. They founded the first IVF program for infertile patients and trained other scientists in their techniques.

72. (2) Lactometer is used for measuring the density (creaminess) of milk. It is essentially a hydrometer which is an instrument used to measure the specific gravity (or relative density) of liquids; that is, the ratio of the density of the liquid to the density of water.

73. (4) The Wright brothers, Orville and Wilbur, were two American brothers, who are credited with inventing and building the world's first successful airplane on December 17, 1903. From 1905 to 1907, the brothers developed their flying machine into the first practical fixed-wing aircraft.

74. (1) Alexander Graham Bell, an eminent Scottish-born scientist, is credited with inventing the first practical telephone in 1876. Among one of his first innovations after the telephone was the "photophone," a device that enabled sound to be transmitted on a beam of light.

75. (2) The first electric light was made in 1800 by Humphry Davy, an English scientist. However, Thomas Edison is usually credited with the invention of the light bulb. He invented the first commercially practical incandescent light in 1879.

76. (4) The Wright brothers, Orville and Wilbur, were two American brothers, who are credited with inventing and building the world's first successful airplane and making the first controlled, powered and sustained heavier-than-air human flight in December 1903. They surpassed their own milestone in 1905 when they built and flew the first fully practical airplane.

77. (4) William Bateson, an English geneticist, co-discovered genetic linkage with Reginald Punnett in 1909. He was the first person to use the term genetics to describe the study of heredity and biological inheritance, and the chief populariser of the ideas of Gregor Mendel.

78. (2) Meteorology is the study of the atmosphere, atmospheric phenomena, and atmospheric effects on our weather. It is a sub-discipline of the atmospheric sciences, a term that covers all studies of the atmosphere. The atmosphere is the gaseous layer of the physical environment that surrounds a planet.

79. (2) Louis Pasteur is traditionally considered as the progenitor of modern immunology because of his studies in the late nineteenth century that popularized the germ theory of disease, and that introduced the hope that all infectious diseases could be prevented as well as treated by vaccination. He developed immunization methods for chicken cholera and anthrax in animals and for human rabies.

80. (1) The instrument used to measure electrical current is called an ammeter, which is actually a shortened form of 'amp meter'. The current is measured in amperes. In scientific labs, a much more sensitive instrument called a galvanometer is used to measure very small currents.

81. (4) Sir Alexander Fleming discovered the world's first antibiotic—benzylpenicillin (Penicillin G)—from the mould Penicillium notatum in 1928. For this discovery, he shared the Nobel Prize in Physiology or Medicine in 1945 with Howard Florey and Ernst Boris Chain.

82. (1) Selman Waksman was awarded the Nobel Prize in 1952 "for his discovery of streptomycin, the first antibiotic effective against tuberculosis." He was called "one of the greatest benefactors to mankind," as the result of the discovery of streptomycin. Waksman was a Russian-born, Jewish-American inventor, biochemist and microbiologist.

83. (1) French physicist Henri Becquerel discovered radioactivity by accident in 1896 when a piece of uranium left in a dark desk drawer made an image on photographic plates. The husband and wife team of Pierre and Marie Curie became interested in Becquerel's discovery. While experimenting with their own uranium-containing ore, they came up with the term "radioactivity" to describe the spontaneous emissions that they studied.

84. (3) In 1970, American virologists Howard Martin Temin and David Baltimore along with Japanese virologist Satoshi Mizutani, working independently, reported the discovery of an enzyme that could synthesize proviral DNA from the RNA genome of RSV. This enzyme was named RNA-directed DNA polymerase, commonly referred to as reverse transcriptase.

85. (2) Phycology is the scientific study of algae. Phycology or algology is a branch of life science and often is regarded as a sub-discipline of botany. It includes the study of prokaryotic forms known as blue-green algae or cyanobacteria.

86. (1) King Camp Gillette, an American businessman, invented the best selling version of the safety razor in 1901. Several models were in existence before Gillette's design. Gillette's innovation was the thin, inexpensive, disposable blade of stamped steel. Gillette is widely credited with inventing the so-called razor and blades business model.

87. (3) Though Gregor Mendel (1822–1884) first suggested existence of discrete inheritable units, he did not use the term gene. Gene was coined in 1909 by Danish botanist Wilhelm Johannsen to describe the fundamental physical and functional unit of heredity. The related word genetics was first used by William Bateson in 1905.

88. (2) Aneroid barometer is an instrument for measuring pressure as a method that does not involve liquid. Invented in 1844 by French scientist Lucien Vidi, it uses a small, flexible metal box called an aneroid cell, which is made from an alloy of beryllium and copper.

89. (*) There are two ways in which scientists quantify the size of earthquakes: magnitude and intensity. Magnitude measures the energy released at the source of the earthquake; Intensity measures the strength of shaking produced by the earthquake at a certain location. The **Richter Scale is used for measuring the magnitude of earthquakes**. The magnitude value is proportional to the logarithm of the amplitude of the strongest wave during an earthquake. **Mercalli scale is used to measure intensity of earthquakes**. The intensity of a quake differs greatly from place to place. It depends upon such factors as the distance from the epicenter, the design and quality of construction of local buildings, and the type of surface beneath the buildings.

90. (2) In 1800, Alessandro Volta, an Italian physicist, invented the first true battery, which came to be known as the voltaic pile. The voltaic pile consisted of pairs of copper and zinc discs piled on top of each other, separated by a layer of cloth or cardboard soaked in brine (i.e., the electrolyte).

91. (2) The connection between electricity and magnetism was discovered by famous Danish chemist and physicist, Hans Christian Oersted in 1819. Starting about a decade after Oersted's discovery, Michael Faraday demonstrated essentially the opposite of what Oersted had found–that a changing magnetic field induces an electric current. He achieved an electrical current from a changing magnetic field, a phenomenon known as electromagnetic induction. Following Faraday's work, James Clerk Maxwell developed equations, formally unifying electricity and magnetism. So it was Maxwell who formulated the relationship between electricity and magnetism.

92. (4) Araneology is a branch of zoology that deals with the study of spiders. It is a branch of Arachnology, the scientific study of spiders and related animals such as scorpions, pseudo-scorpions, and harvestmen, collectively called arachnids.

93. (4) A planimeter, also known as a platometer, is a measuring instrument used to determine the area of an arbitrary two-dimensional shape. They were once common, but have now largely been replaced by digital tools. The Swiss mathematician Jakob Amsler-Laffon built the first modern planimeter in 1854.

94. (3) The term "ecosystem" was first coined by Roy Clapham in 1930, but it was ecologist Arthur Tansley who fully defined the ecosystem concept. In his classic article of 1935, Tansley defined ecosystems as "The whole system,..including not only the organism-complex, but also the whole complex of physical factors forming what we call the environment."

95. (3) Gottlieb Daimler invented the prototype of the modern gasoline engine in 1885. This gas engine was made with a vertical cylinder, and gasoline injected through a carburetor (patented in 1887). Daimler first built a two-wheeled vehicle the "Reitwagen" (Riding Carriage) with this engine and a year later built the world's first four-wheeled motor vehicle.

96. (1) Arboriculture is the cultivation, management, and study of individual trees, shrubs, vines, vegetables and other perennial woody plants. It is primarily focused on individual woody plants and trees maintained for permanent landscape and amenity purposes, usually in gardens, parks or other populated settings, by arborists, for the enjoyment, protection, and benefit of human beings. It falls under the general umbrella of horticulture.

97. (1) A venturi meter is used to measure the flow speed of a fluid in a pipe. It is essentially a short pipe consisting of two conical parts with a short portion of uniform cross-section in between. It is always used in a way that the upstream part of the flow takes place through the short conical portion while the downstream part of the flow through the long one.

98. (4) Martin Cooper, an American engineer, conceived the first handheld mobile phone while at Motorola in 1973. He led the team that developed it and brought it to market in 1983. He is considered the "father of the cell phone" and is also cited as the first person in history to make a handheld cellular phone call in public.

(2) **99.** ~~(1)~~ Seismography is the scientific measuring and recording of the shock and vibrations of earthquakes. The study of these records is known as seismology. The instrument for automatically detecting and recording the intensity, direction, and duration of a movement of the ground, especially of an earthquake, is known as seismograph.

100. (1) A lysimeter is used to measure the amount of actual evapotranspiration which is released by plants. By recording the amount of precipitation that an area receives and the amount lost through the soil, the amount of water lost to evapotranspiration can be calculated.

101. (3) A photometer is an instrument that can be used for absorption, emission or fluorescence measurement with ultraviolet, visible or infrared radiation. It has filters for wavelength selection and a photoelectric device for measuring radiation (Detection and Analysis by E. N. Ramsden).

102. (4) In physics, cryogenics is the study of the production and behaviour of materials at very low temperatures. It is not well-defined at what point on the temperature scale refrigeration ends and cryogenics begins, but scientists assume it starts at or below -150°C (123 K; -238 °F).

103. (3) Entomologyis the scientific study of insects, a branch of zoology. Like several of the other fields that are categorized within zoology, entomology is a taxon-based category. At some 1.3 million described species, insects account for more than two-thirds of all known organisms.

104. (1) World Wide Web (www) was invented by English scientist Tim Berners-Lee in 1989. It is an information space where documents and other web resources are identified by URLs, interlinked by hypertext links, and can be accessed via the Internet.

105. (4) Polystyrene is a synthetic aromatic polymer made from the monomer styrene. It is non-biodegradable, i.e., it cannot be decomposed by bacteria or other living organisms. It was discovered in 1839 by Eduard Simon. Polystyrene is one of the most widely used plastics used in protective packaging (CD and DVD cases), containers, lids, bottles, trays, disposable cutlery.

106. (3) When Card David Anderson discovered a new particle with a mass between that of the electron and proton, he named it 'mesoton' in a 1933 publication in the Physical Review. However, on the advice of Professor R.A. Millikan, he changed the name to 'mesotron' although he (Anderson) did not agree with it. Homi Jehangir Bhabha then sent a short paper to Nature journal in February 1939 in which he proposed the name meson. The name given by Bhabha has remained to this day and is used for a class of elementary particles.

107. (2) An anemometer is a device used for measuring wind speed. The term is derived from the Greek word anemos (wind). The first known description of an anemometer was given by Leon Battista Alberti in 1450.

108. (2) Pedology is the study of soils in their natural environment. It is one of two main branches of soil science, the other being edaphology. Pedology deals with pedogenesis, soil morphology, and soil classification, while edaphology studies the way soils influence plants, fungi, and other living things.

109. (2) Myrmecology is a branch of entomology focusing on the scientific study of ants. The word myrmecology was coined by William Morton Wheeler (1865–1937). The earliest scientific thinking based on observation of ant life was that of Auguste Forel (1848–1931)

110. (4) Seismology is the study of earthquakes and seismic waves that move through and around the earth. The field also includes studies of earthquake environmental effects, such as tsunamis as well as diverse seismic sources such as volcanic, tectonic, oceanic, atmospheric, and artificial processes.

111. (1) Lux meters, also known as light meters, measure the intensity of light as perceived by the human eye with the help of photo detectors.The lux is the SI unit of illuminance and luminous emittance, measuring luminous flux per unit area. In photometry, it is used as a measure of the intensity, as perceived by the human eye, of light that hits or passes through a surface.

112. (2) Epigraphy is the study of inscriptions or epigraphs as writing. It is the science of identifying graphemes, clarifying their meanings, classifying their uses according to dates and cultural contexts, and drawing conclusions about the writing and the writers. A per-

son using the methods of epigraphy is called an epigrapher or epigraphist.

113. (3) A pyrometer is a type of remote-sensing thermometer used to measure the temperature of a surface. It is a device that from a distance determines the temperature of a luminous surface from the spectrum of the thermal radiation it emits, a process known as pyrometry.

114. (3) A eudiometer is a laboratory device that measures the change in volume of a gas mixture following a physical or chemical change. Applications of a eudiometer include the analysis of gases and the determination of volume differences in chemical reactions. It is similar in structure to the meteorological barometer.

115. (2) There are different methods of counting microbial growth. These are based on different parameters of cells such as dry-weight and wet-weight measurement, absorbance, cell plate, density, turbidity, ATP measurement, viable count, ATPase activity and use of Coulter counter. Absorbance is measured by using a spectrophotometer. Cell growth of any bacterial suspension at a particular wavelength at different intervals is measured in terms of absorbance.

116. (4) Paleontology is the study of fossils and biology of extinct organisms. It is the scientific study of life that existed prior to, and sometimes including, the start of the Holocene Epoch (roughly 11,700 years before present). Paleontology lies on the border between biology and geology, but differs from archaeology in that it excludes the study of anatomically modern humans

117. (3) The Beaufort scale is an empirical measure for describing wind velocity based on observed sea conditions. The scale was devised in 1805 by Irish-born Francis Beaufort (later Rear Admiral Sir Francis Beaufort), a Royal Navy officer, while serving in HMS Woolwich.

118. (2) A barometer is a scientific instrument used in meteorology to measure atmospheric pressure. Pressure tendency can forecast short term changes in the weather. Evangelista Torricelli is universally credited with inventing the barometer in 1643.

119. (4) A hygrometer, also known as a psychrometer, is used to measure the humidity in the air. A common way these devices work is by using a material that attracts moisture, and that changes depending on how moist it is. Aside from greenhouses and industrial spaces, hygrometers are also used in some incubators, saunas, humidors and museums.

120. (3) An anemometer is a device used for measuring the speed of wind. Anemometers are important tools for meteorologists, who study weather patterns. They are also important to the work of physicists, who study the way air moves.

121. (2) Agronomy is the science and technology of raising plants for food, fuel, fibre etc. To be specific, it is a branch of agricultural science that deals with the study of crops and the soils in which they grow. Agronomists, sometimes known as crop scientists, specialize in producing and improving food crops through conducting experiments and developing methods of production.They conduct research in crop rotation, irrigation and drainage, plant breeding, soil classification, soil fertility, weed control, and other areas.

122. (3) Museology is the study of museums and museum curation. Because the framework of museums lies in material objects as primary sources, it is indirectly concerned with the preservation of historical articles.

123. (4) The spectroheliograph is an instrument used in astronomy which captures a photographic image of the Sun at a single wavelength of light, a monochromatic image. The wavelength is usually chosen to coincide with an spectral wavelength of one of the chemical elements present in the Sun.

124. (2) A sextant is a doubly reflecting navigation instrument used to determine the angle between an astronomical object and the horizon for the purposes of celestial navigation. Common uses of the sextant include sighting the sun at solar noon or Polaris at night (in the Northern Hemisphere) to determine latitude.

125. (1) Pedology is the study of soils in their natural environment. It is concerned with all aspects of soils, including their physical and chemical properties, the role of organisms in soil production and in relation to soil character, the description and mapping of soil units, and the origin and formation of soils.

126. (3) Orology is the branch of physical geography dealing with mountains. It is a field of research that regionally concentrates on the Earth's surface's part covered by mountain landscapes.

127. (2) ~~Lactometer is a device used to measure the specific gravity, and therefore the richness, of milk. It is based on law of floatation which states that when a solid is immersed in a liquid, it is subject to upward thrust equal to the weight of the liquid displaced by the body and acting in upward direction.~~ It is useful for testing the purity of milk.

128. (4) Palaeontology is the study of fossils to determine the structure and evolution of extinct animals and plants and the age and conditions of deposition of the rock strata in which they are found. Body fossils and trace fossils are the principal types of evidence about ancient life.

129. (2) Scientists are able to understand Earth's interior with the help of seismology. Seismology involves the study of seismic waves that travel through Earth. Seismic waves are sent through the earth during earthquakes. In contrast, Plate Tectonics is the study of the movement of the Earth's crust due mainly to forces in the crust and upper mantle of the Earth's interior.

130. (1) Ecology is defined as the study of the patterns and processes governing the abundance and distribution of organisms and their relationships to their environment. It is the science that deals with the inter-relationship between the various organisms living in an area and their relationship with physical environment.

131. (2) Systemic arterial blood pressure usually is measured using an instrument called a sphygmomanometer. This device consists of an inflatable rubber cuff connected by tubing to a compressible bulb and a glass tube containing a column of mercury. The bulb is used to pump air into the cuff, and a rise in the mercury column indicates the pressure produced.

132. (2) Attempts to create helicopters can be traced back to Leonardo da Vinci, but the first working prototype helicopter, the VS-300, was invented by Igor Sikorsky in 1939. The next model he designed was the R-4 in 1942, which was the world's first mass produced helicopter. ❑❑❑