

WBCS Main Exam. (Paper-IV) – Practice Set

Answer with Explanation

1. (c) The unit of temperature is kelvin, power is measured in watt, pressure in pascal and force in newton.
2. (d) Revolver was discovered by Colt. Dynamite was discovered by Alfred Nobel. Law of cooling was discovered by Newton and law of pressure by Pascal. শ্রীচিভর্ষ
3. (a) Magnetic resonance imaging is based on the phenomenon nuclear magnetic resonance.
4. (c) An endoscopic process is based on the principle of total internal reflection of light.
5. (c) The unit of acceleration is metre per sec². The unit of electric current is ampere. The unit of work done is joule. The unit of impulse is newton second.
6. (c) Heat is a form of energy. Heat can be reflected by mirror. Heat can't pass through vacuum.
7. (d) Galvanometers are electrical devices used for the detection or measurement of the electric currents.
8. (a) The principle of total internal reflection is applicable to explain the formation of image in desert and operation of optical fibres. The formation of image in microscope and colour of evening sky are based on refraction of light.
9. (d) A - (r); B - (p); C - (s); D - (q)
10. (b) Cosmic rays have very high frequency $>10^{23}$ Hz and wavelength $<10^{-24}$ m.
11. (b) According to Archimede's principle when a body is immersed fully or partially in a liquid, it experiences an upward force that is equal to the weight of the fluid displaced by it therefore the mass of water displaced is equal to the mass of the ship. শ্রীচিভর্ষ
12. (c) (i), (ii) & (iii)
13. (b) The Sun seems to rise two minutes before the actual Sunrise due to the phenomenon of atmospheric refraction.
14. (a) The electron was discovered in 1896, by the British physicist J. J. Thomson, using cathode rays while doing discharge tube experiments. In 1886, Eugen Goldstein discovered the existence of a new type of rays in discharge tube and named as anode rays or canal rays. Canal or anode rays travel in straight line and are deflected by electric field towards cathode which proves that they are composed of positively charged particles. These lightest positively charged particles were named and characterised as protons by Ernest Rutherford in 1919 who purposed Rutherford model for atom to explain the atomic structure. Anti-electron or in other words the positron was discovered in 1932 by Anderson, a physicists and he found that the bombardment of boron with an alpha particle resulted in the emission of this particle. In 1932, James Chadwick, an English physicist who had worked with Rutherford, detected neutrons.
15. (c) Sour milk – Lactic acid শ্রীচিভর্ষ
Vinegar and pickel – Acetic acid
Soda water – Carbonic acid
Apple – Malic acid
16. (c) Cerargyrite, also called Horn Silver, gray, very heavy halide mineral composed of silver chloride (AgCl); it is an ore of silver.
Tiny particles of silver iodide are sprayed on a cloud from an aeroplane. The particles attract water drops from the cloud. When they form a drop that is large enough, it starts raining.
Zinc phosphide is an inorganic compound that is used in pesticide products as a rodenticide. Zinc oxide is also known as philosopher's wool.
17. (b) As a gemstone used in jewellery, silicon carbide is called "synthetic moissanite" or just "moissanite". Moissanite is similar to diamond in several important respects it is transparent and hard. Moissanite has become popular as a diamond substitute, and may be misidentified as diamond, since its thermal conductivity is close to that of diamond, more than any other diamond substitute.
18. (d) Nickel silver, also known as German silver, is a copper alloy with nickel and often zinc. Solders are typically made from tin or lead or a combination of both in the ratio of 63:37 respectively. শ্রীচিভর্ষ
Calcium hypochlorite, also known as bleaching powder, is a chemical compound with formula

$\text{Ca}(\text{ClO})_2$. It is widely used for water treatment and as a bleaching agent. This chemical is considered to be relatively stable and has greater available chlorine than sodium hypochlorite (liquid bleach).

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Hypo solution is the abbreviation for sodium thiosulphate or sodium hyposulphite, a chemical used to fix the image on photographic film after it has been developed.

19. (d) When CO is not ventilated it binds to haemoglobin, which is the principal oxygen-carrying compound in blood; this produces a compound known as carboxyhaemoglobin. The traditional belief is that carbon monoxide toxicity arises from the formation of carboxyhaemoglobin, which decreases the oxygen-carrying capacity of the blood and inhibits the transport, delivery, and utilization of oxygen by the body.

20. (b) Cooking gas consists of mostly liquified butane and isobutane.

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21. (a) Potassium bromide is a salt used to make photographic papers and plates and for process engraving.

Gunpowder, also known since the late 19th century as black powder, is a mixture of sulphur, charcoal, and potassium nitrate (saltpeter)—with the sulphur and charcoal acting as fuels, while the saltpeter works as an oxidizer.

The principal use of potassium sulphate is as a fertilizer. K_2SO_4 does not contain chloride, which can be harmful to some crops. Potassium sulphate is preferred for these crops, which include tobacco and some fruits and vegetables.

A white, acid, crystalline solid or powder, $\text{KHC}_4\text{H}_4\text{O}_6$, used in baking powder, in the tinning of metals, and as a component of laxatives. Also called cream of tartar.

22. (b) CNG – Butane, ethane

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Coal gas – Hydrogen, methane, CO

LPG – Butane, propane

Water gas – CO, hydrogen

23. (a) Bleaching powder or calcium hypochlorite is a chemical compound with formula $\text{Ca}(\text{ClO})_2$.

The chemical formula for marble is CaCO_3 . It is calcium carbonate. Marble is used in various applications, including home design.

Gypsum is a very soft sulphate mineral composed of calcium sulphate dihydrate, with the chemical formula $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. It can be

used as a fertilizer, is the main constituent in many forms of plaster and is widely mined.

24. (a) These compounds are used in the manufacture of the following products. Cellulose nitrate- Gun powder, Potassium Sulphate- Fertiliser, Potassium salts of fatty acids- Soft soap, Calcium oxide-Glass.

25. (d)

26. (d)

27. (d)

28. (a)

29. (c) Sodium stearate is a typical example of detergent or soap. It contains a long hydrocarbon tail and a carboxylic acid head group.

30. (a) n-heptane has octane number of 0.02-methyl heptane → 21.7

Iso-octane → 100.00

2, 2-dimethyl hexane → 72.5

31. (c) Radium was discovered in 1898 by Madame Curie from pitchblende a material that contains uranium.

32. (b) Sodium azide is used in airbag, used for safety of car driver. Under room temperature, sodium azide is a stable compound. However when heated by an impulse it disintegrates to produce sodium and nitrogen. It only takes about 50-100 grams sodium azide to produce enough nitrogen gas to fill a normal air bag for driver.

33. (d) Formic acid – Ant's sting

Tartaric acid – Tamarind

Oxalic acid – Spinach

Citric acid – Orange

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34. (c) CO and oxides of nitrogen are poisonous gases present in automobile exhaust gases.

35. (d) Table salt is refined salt, which contains about 97 to 99 percent sodium chloride. It usually contains substances that make it free-flowing (anticaking agents) such as sodium aluminosilicate or magnesium carbonate. Because of Hygroscopic nature of salt it become wet in rainy season as the salt absorbs moisture from environment.

36. (a) Diamond is harder than graphite because diamond has a more complex structure. Diamond's structure is like many pentagons connected together, each pentagon sharing a side with another pentagon or each pentagon sharing a point with another pentagon.

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All the points are linked together in some way. Graphite's structure is very loose, with its bonds forming layers. There will be one sheet of elements bonded together, but then another sheet of bonds of elements will lay on top of that, and there will be very weak bonds holding those sheets together.

37. (c) Nickel silver, also known as German silver, Argentan, new silver, nickel brass, albata, alpacca, or electrum, is a copper alloy with nickel and often zinc. The usual formulation is 60% copper, 20% nickel and 20% zinc. Nickel silver is named for its silvery appearance, but it contains no elemental silver unless plated. The name "German silver" refers to its development by 19th-century German metalworkers in imitation of the Chinese alloy known as paktong (Cupronickel) All modern, commercially important nickel silvers (such as those standardized under ASTM B122) contain significant amounts of zinc, and are sometimes considered a subset of brass. It is used in zippers, better-quality keys, costume jewellery, for making musical instruments (e.g., cymbals, saxophones), and is preferred for the track in electrically powered model railway layouts, as its oxide is conductive. It is widely used in the production of coins (e.g. Portuguese escudo and the former GDR marks,). Its industrial and technical uses include marine fittings and plumbing fixtures for its corrosion resistance, and heating coils for its high electrical resistance.
38. (b) Pasteurization typically uses temperatures below boiling, since at very high temperatures, casein micelles will irreversibly aggregate, or "curdle". The two main types of pasteurization used today are: high temperature, short-time (HTST) and "extended shelf life" (ESL) treatment. Ultra-high temperature (UHT or ultra-heat-treated) is also used for milk treatment. In the HTST process, milk is forced between metal plates or through pipes heated on the outside by hot water, and is heated to 71.7 degree C (161 degree F) for 15–20 seconds. UHT processing holds the milk at a temperature of 135 degree C (275 degree F) for a minimum of one second. ESL milk has a microbial filtration step and lower temperatures than UHT milk.
- Milk simply labeled "pasteurized" is usually treated with the HTST method, whereas milk labeled "ultrapasteurized" or simply "UHT" has

been treated with the UHT method. A less conventional but US FDA legal alternative (typically for home pasteurization) is to heat milk at 145 degree F (63 degree C) for 30 minutes.

39. (c) The largest scale application of hydrogenation is for the processing of vegetable oils (fats to give margarine and related spreads and shortenings). Typical vegetable oils are derived from polyunsaturated fatty acids (containing more than one carbon-carbon double bonds). Their partial hydrogenation reduces most but not all, of these carbon-carbon double bonds. Hydrogenation converts liquid vegetable oils into solid or semi-solid fats, such as those present in margarine. Hydrogenation-to treat with hydrogen - is a chemical reaction between molecular hydrogen (H_2) and another compound or element, usually in the presence of a catalyst. The process is commonly employed to reduce or saturate organic compounds. Hydrogenation typically constitutes the addition of pairs of hydrogen atoms to a molecule, generally an alkene.
40. (b) An atomic clock is a clock device that uses an electronic transition frequency in the microwave, optical, or ultraviolet region of the electromagnetic spectrum of atoms as a frequency standard for its timekeeping element. Atomic clocks are the most accurate time and frequency standards known, and are used as primary standards for international time distribution services, to control the wave frequency of television broadcasts, and in global navigation satellite systems such as GPS. The principle of operation of an atomic clock is not based on nuclear physics, but rather on atomic physics and using the microwave signal that electrons in atoms emit when they change energy levels. Early atomic clocks were based on masers at room temperature. Currently, the most accurate atomic clocks first cool the atoms to near absolute zero temperature by slowing them with lasers and probing them in atomic fountains in a microwave-filled cavity. The first accurate atomic clock, a caesium standard based on a certain transition of the caesium-133 atom, was built by Louis Essen in 1955 at the National Physical Laboratory in the UK. Calibration of the caesium standard atomic clock was carried out by the use of the astronomical time scale ephemeris time (ET).

41. (b) Surface tension is a contractive tendency of the surface of a liquid that allows it to resist an external force. This property is caused by cohesion of similar molecules, and is responsible for many of the behaviors of liquids. It is revealed, for example, in the floating of some objects on the surface of water, even though they are denser than water, and in the ability of some insects (e.g. water striders) to run on the water surface. অ্যাসিডিক্স
42. (b) It is just because woolen clothes have fibres and between those fibres air is trapped which reduces heat loss. Air reduces heat loss because it is an insulator or poor conductor of heat. Wool has several qualities that distinguish it from hair or fur: it is crimped, it is elastic, and it grows in staples (clusters). Wool's scaling and crimp make it easier to spin the fleece by helping the individual fibers attach to each other, so they stay together. Because of the crimp, wool fabrics have a greater bulk than other textiles, and retain air, which causes the product to retain heat.
43. (b) A dynamo is a device for converting mechanical energy into electrical energy, esp. one that produces direct current. A dynamo is an electrical generator that produces direct current with the use of a commutator. Dynamos were the first electrical generators capable of delivering power for industry, and the foundation upon which many other later electric-power conversion devices were based, including the electric motor, the alternating-current alternator, and the rotary converter. A dynamo has the disadvantages of a mechanical commutator. Also, converting alternating to direct current using power rectification devices (vacuum tube or more recently solid state) is effective and usually economic. অ্যাসিডিক্স
44. (d) Lambert's Law says that the intensity of emitted light from a surface is directly proportional to the cosine of the angle between the line of view and the normal to the surface. A Lambertian surface is a surface that follows this rule exactly. In practice, most surfaces are not perfectly Lambertian. A surface which obeys Lambert's law is said to be Lambertian, and exhibits Lambertian reflectance. Such a surface has the same radiance when viewed from any angle. This means, for example, that to the human eye it has the same apparent brightness (or luminance). It has the same radiance because, although the emitted power from a given area element is reduced by the cosine of the emission angle, the apparent size (solid angle) of the observed area, as seen by a viewer, is decreased by a corresponding amount. Therefore, its radiance (power per unit solid angle per unit projected source area) is the same. অ্যাসিডিক্স
45. (c) The term energy is used to describe the capacity of a system to do work on another system. Energy of all types (Surface Tension, Kinetic, Potential etc.) have the same dimension and unit as that of Work. Both energy and work have the same dimensional formula of $M^1L^2T^{-2}$. In the SI system, both have the same units of Newton meter.
46. (b) The density of gases depends upon the temperature. The higher the temperature, the more the molecules are spread out and the lower the density. The result is that warm gases rise and cool gases sink. The same concept helps to explain the weather resulting in high and low pressures. High pressure means high density, cooler, sinking air. Low pressure means low density, warmer, rising air. In general, density can be changed by changing either the pressure or the temperature. অ্যাসিডিক্স
47. (a) A telescope assists the eye chiefly in two way by enlarging the visual angle under which a distant object is seen, and thus magnifying that object; and, secondly, by collecting, and conveying to the eye, a larger beam of light than would enter the naked organ, thus rendering objects distinct and visible which would otherwise be indistinct and or invisible. It's essential parts are the object glass, or concave mirror, which collects the beam of light, and forms an image of the object, and the eyeglass, which is a microscope, by which the image is magnified. Terrestrial telescope is a telescope whose eyepiece has one or two lenses more than the astronomical, for the purpose of inverting the image and exhibiting objects erect. The terrestrial telescope is also known as the spyglass. অ্যাসিডিক্স
48. (d) Bats use echolocation to navigate and forage, often in total darkness. They generally emerge from their roosts in caves, attics, or trees at dusk and hunt for insects into the night. Their use of echolocation allows them to occupy a niche where there are often many insects (that come out at night since there are fewer predators

then) and where there is less competition for food, and where there are fewer other species that may prey on the bats themselves. Microbats generate ultrasound via the larynx and emit the sound through the open mouth or, much more rarely, the nose.

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49. (c) Ultrasound is a cyclic sound pressure wave with a frequency greater than the upper limit of the human hearing range. Ultrasound is thus not separated from “normal” (audible) sound based on differences in physical properties, only the fact that humans cannot hear it. Although this limit varies from person to person, it is approximately 20 kilohertz (20,000 hertz) in healthy, young adults. Ultrasound devices operate with frequencies from 20 kHz up to several gigahertz.
50. (c) Gamma radiation, also known as gamma rays or hyphenated as gamma-rays and denoted as γ , is electromagnetic radiation of high frequency and therefore high energy. Gamma rays are ionizing radiation and are thus biologically hazardous. They are classically produced by the decay from high energy states of atomic nuclei (gamma decay), but are also created by other processes. 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 keV to 100 keV. They are shorter in wavelength than UV rays and longer than gamma rays.
51. (d) Plague is a deadly infectious disease, caused by the enterobacteria *Yersinia pestis*. Until 2007, plague, yellow fever, and cholera were the three epidemic diseases reported to WHO.
AIDS is caused by human immunodeficiency virus.
Baldness can be caused by a fungus *Microsporum audouinii*, a common cause of ringworm and associated hair loss.
Malaria is mosquito-borne infectious disease of humans caused by protozoa of genus *Plasmodium*.
52. (a) ECG is a test that measures the electrical activity of the heart. ECG is used to measure the rate and regularity of heart beats.
53. (c) The HIV is transmitted by exchange of body fluids during sexual intercourse, any kind of infected blood transfusion. It can also be transmitted from mother to the foetus via blood transfusion across placenta.
54. (c) Night blindness is caused by deficiency of vitamin-A. Deficiency of vitamin D causes rickets. Deficiency of vitamin C causes scurvy. Deficiency of vitamin B causes beri-beri.
55. (b) Cotton wool is all made of fibres of cellulose. Honey gets its sweetness from fructose and glucose.
Maltose or malt sugar is a disaccharide. Sugarcane contains sucrose.
56. (a) Emphysema is the common lung disease caused by asbestos. Emphysema is a lung condition in which tiny air sacs in the lungs - alveoli - fill up with air. As the air continues to build up in these sacs, they expand, and may break or become damaged and form scar tissue. The patient becomes progressively short of breath. Emphysema is a type of COPD (chronic obstructive pulmonary disease).
57. (c) The peanuts, or groundnut (*Arachishypogaea*), is a species in the legume “bean” family (Fabaceae). The cultivated peanut was probably first domesticated in the valleys of Peru. It is an annual herbaceous plant growing tall.
58. (a) Cadmium (Cd), a by-product of zinc production, is one of the most toxic elements to which man can be exposed at work or in the environment. Once absorbed, Cd is efficiently retained in the human body, in which it accumulates throughout life. Cd is primarily toxic to the kidney, especially to the proximal tubular cells, the main site of accumulation. Cadmium accumulates in the kidneys and may sometimes cause kidney failure when it is in excess.
59. (a) Deoxyribonucleic acid (DNA) molecules are informational molecules encoding the genetic instructions used in the development and functioning of all known living organisms and many viruses. DNA is one of the three major macromolecules that are essential for all known forms of life. Genetic information is encoded as a sequence of nucleotides (guanine, adenine, thymine, and cytosine) recorded using the letters G, A, T, and C. DNA is well-suited for biological information storage, since the DNA backbone is resistant to cleavage and the doublestranded structure provides the molecule with a built-in duplicate of the encoded information.

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60. (b) Oxygen liberated during photosynthesis is coming to create a stable, unstirred layer to support surface neutralization of acid and act as a protective physical barrier against luminal pepsin. অ্যাচিভার্স
61. (d) Low-calorie sweeteners are sugar substitutes that have zero calories and do not raise blood glucose levels through eating them, which makes them a preferable choice for diabetic people over sugar.
62. (a) Bacillus is a genus of Gram-positive, rod-shaped bacteria and a member of the phylum Firmicutes. Bacillus species can be obligate aerobes or facultative anaerobes, and test positive for the enzyme catalase.
Bacillus includes both free-living and pathogenic species. Under stressful environmental conditions, the cells produce oval endospores that can stay dormant for extended periods.
63. (b) Eugen Steinach discovered the sex hormones in 1921. He conducted experiments in the transplantation of a male guinea pig's testes into a female and the castration of the male. The testes secretion, now known as testosterone, resulted in the female guinea pig developing male sexual behavior such as mounting the partner. This led Steinach to theorize that the gland's secretions were responsible for sexuality.
64. (b) Apples are a great, healthy food, but even with the skin they do not contain a large amount of iron. Apples contain 11 milligrams of iron per 100 grams. A gram is a measure of weight. Fruit as a food group is not a great iron source but it does play an important role in our ability to absorb iron. Fruit is often loaded with vitamin C, a vitamin that will actually help to utilize the iron in vegetarian foods; apples are a modest source of vitamin C. অ্যাচিভার্স
65. (a) Virus particles (known as virions) consist of two or three parts: the genetic material made from either DNA or RNA, long molecules that carry genetic information, a protein coat that protects these genes, and in some cases an envelope of lipids that surrounds the protein coat when they are outside a cell. The shapes of viruses range from simple helical and icosahedral forms to more complex structures.
66. (c) Kidneys are essential in the urinary system and also serve homeostatic functions such as the regulation of electrolytes, maintenance of acid–base balance, and regulation of blood pressure (via maintaining salt and water balance). They serve the body as a natural filter of the blood, and remove wastes which are diverted to the urinary bladder whereas the antibodies are produced by antigens in the cell. অ্যাচিভার্স
67. (c) Motion sickness or kinetosis, also known as travel sickness, is a condition in which a disagreement exists between visually perceived movement and the vestibular system's sense of movement. Depending on the cause it can also be referred to as seasickness, car sickness, simulation sickness or airsickness. If the motion causing nausea is not resolved, the sufferer will usually vomit. Ginger is reported to calm the pyloric valve located at the base of the stomach. This relaxation of the valve allows the stomach to operate normally whereby the contents will enter the small intestine instead of being retained within the stomach. অ্যাচিভার্স
It is this undesirable effect of retention in the stomach that eventually results in vomiting.
68. (b) The ostrich is the largest and heaviest bird that is alive today. Although it cannot fly, the ostrich is also the fastest-running bird today; it can run up to about 43 mph (70 kph). It can outrun most predators, but can also kick to protect itself; another strategy against threats is to crouch close to the ground to camouflage itself. The ostrich can grow up to 9 feet (2.7 m) tall and weighs up to 345 pounds (156 kg). The ostrich also has the biggest eyeballs of any bird alive today; each eyeball is 2 inches (5 cm) across. It has a long neck that allows it to see predators from far away.
69. (b) A food chain is a linear sequence of links in a food web starting from a trophic species that eats no other species in the web and ends at a trophic species that is eaten by no other species in the web. Plant, rabbit and tiger form a food chain where plant represents producer, rabbits represent a vegetarian, while tiger represents a non-vegetarian. অ্যাচিভার্স
70. (d) Neutering involves removing the source of the hormones that control reproduction and that determine the typical physical and behavioral characteristics that distinguish males and females. In dogs and cats, this is usually done by surgically removing the testicles in males (castration) and the ovaries in females (spaying).

The primary purpose of neutering is to prevent reproduction.

71. (d) The time period 'T' of a simple pendulum is

given by $T = 2\pi\sqrt{\frac{l}{g}}$, where l is the length and g

is the acceleration due to gravity. Let us suppose

g be to be a constant, then $T = 2\pi\sqrt{l}$. So the time period of a pendulum is directly proportional to the square root of its length. So, if the length increases, its time period also increase. It means that it takes longer to complete one oscillation. So when its length is halved, its time period is decreased by a factor of $\sqrt{2}$. **প্র্যাচিভার্স**

72. (c) A type of glass that contains cerium and other rare earths and has a high absorption of ultraviolet radiation is used in sunglasses. Sunglasses or sun glasses are a form of protective eyewear designed primarily to prevent bright sunlight and high-energy visible light from damaging or discomforting the eyes.

They can sometimes also function as a visual aid, as variously termed spectacles or glasses exist, featuring lenses that are coloured, polarized or darkened. In the early 20th century they were also known as sun cheaters. The colour of the lens can vary depending on style, fashion, and purpose, but for general use, red, grey, green, or brown are recommended to avoid or minimize colour distortion, which could affect safety when, for instance, driving a car or a school bus. **প্র্যাচিভার্স**

73. (b) The visible spectrum is the portion of the electromagnetic spectrum that is visible to (can be detected by) the human eye. Electromagnetic radiation in this range of wavelengths is called visible light or simply light. A typical human eye will respond to wavelengths from about 390 to 750 nm in terms of angstrom it is in between 3900 Å-7600 Å. In terms of frequency, this corresponds to a band in the vicinity of 400–790 THz. A light-adapted eye generally has its maximum sensitivity at around 555 nm (540 THz), in the green region of the optical spectrum (luminosity function). The spectrum does not, however, contain all the colours that the human eyes and brain can distinguish. Unsaturated colours such as pink, or purple variations such as magenta, are absent, for example, because they can be made only by a mix of multiple wavelengths.

74. (a) Mesons are not produced by radioactive decay, but appear in nature only as short-lived products of very high-energy interactions in matter, between particles made of quarks. In cosmic ray interactions, for example, such particles are ordinary protons and neutrons. Mesons are hadronic subatomic particles composed of one quark and one anti-quark, bound together by the strong interaction. Because mesons are composed of sub-particles, they have a physical size, with a radius roughly one femtometre, which is about 2/3 the size of a proton or neutron. All mesons are unstable, with the longest-lived lasting for only a few hundredths of a microsecond. Charged mesons decay (sometimes through intermediate particles) to form electrons and neutrinos. **প্র্যাচিভার্স**

75. (d) A polarized 3D system uses polarization glasses to create the illusion of three-dimensional images by restricting the light that reaches each eye, an example of stereoscopy. To present stereoscopic images and films, two images are projected superimposed onto the same screen or display through different polarizing filters. The viewer wears low-cost eyeglasses which contain a pair of different polarizing filters. As each filter passes only that light which is similarly polarized and blocks the light polarized in the opposite direction, each eye sees a different image. This is used to produce a three-dimensional effect by projecting the same scene into both eyes, but depicted from slightly different perspectives.

76. (c) Colour blindness or colour vision deficiency is the inability or decreased ability to see colour, or perceive colour differences, under normal lighting conditions. The most usual cause is a fault in the development of one or more sets of retinal cones that perceive colour in light and transmit that information to the optic nerve. This type of colour blindness is usually a sex-linked condition. Some studies conclude that colour blind people are better at penetrating certain colour camouflages. Such findings may give an evolutionary reason for the high prevalence of red-green colour blindness. **প্র্যাচিভার্স**

77. (b) Concave lens possesses at least one surface that curves inwards. It is a diverging lens, spreading out those light rays that have been refracted through it. A concave lens is thinner at its centre than at its edges, and is used to correct short-sightedness (myopia). After light rays have

passed through the lens, they appear to come from a point called the principal focus. The image formed by a concave lens is virtual, upright, and smaller than the object, and it cannot be projected onto a screen.

78. (b) Flint glass is optical glass that has relatively high refractive index and low Abbe number (high dispersion). A concave lens of flint glass is commonly combined with a convex lens of crown glass to produce an achromatic doublet lens because of their compensating optical properties, which reduces chromatic aberration (colour defects).
79. (c) A mirage is a naturally occurring optical phenomenon in which light rays are bent to produce a displaced image of distant objects or the sky. In contrast to a hallucination, a mirage is a real optical phenomenon which can be captured on camera, since light rays actually are refracted to form the false image at the observer's location. As light passes from colder air across a sharp boundary to significantly warmer air, the light rays bend away from the direction of the temperature gradient. When light rays pass from hotter to cooler, they bend toward the direction of the gradient. If the air near the ground is warmer than that higher up, the light ray bends in a concave, upward trajectory. Once the rays reach the viewer's eye, the visual cortex interprets it as if it traces back along a perfectly straight "line of sight". This line is however at a tangent to the path the ray takes at the point it reaches the eye.
80. (d) The volume of materials changes depending on current temperature. Usually heat makes them expand, and cold leads them to contract. There have to be gaps to avoid strain on the tracks. The same applies in many other fields of engineering, i.e. bridge building.
81. (c) A transistor is a semiconductor device used to amplify and switch electronic signals and electrical power. The first transistors were made from germanium (Ge). Silicon (Si) types currently predominate but certain advanced microwave and high performance versions now employ the compound semiconductor material gallium arsenide (GaAs) and the semiconductor alloy silicon germanium (SiGe).
82. (b) Vikram Misri has been appointed as India's new Foreign Secretary, succeeding Vinay Mohan Kwatra on July 15, 2024. Known for his expertise

in China affairs, Misri served as India's ambassador to China during the 2019-2021 period, including the Galwan Valley clashes.

83. (c) The 16th India-Mongolia Joint Military Exercise Nomadic Elephant started at Umroi, Meghalaya, running from July 3 to 16, 2024. It involves 45 Indian personnel and Mongolian Army's 150 Quick Reaction Force Battalion. The annual event, alternating between the countries, focuses on counter-insurgency in semi-urban and mountainous terrain. Key attendees include Mongolian Ambassador Dambajavyn Ganbold and Major General Prasanna Joshi. The exercise enhances interoperability and defense cooperation.
84. (a) The Indian men's cricket team, led by Rohit Sharma, won the 9th ICC Men's T20 World Cup by defeating South Africa by 7 runs at Kensington Oval, Barbados on 29 June 2024. This is India's second T20 World Cup win, following their 2007 victory. The final marked the T20 retirements of Rohit Sharma, Virat Kohli, and Ravindra Jadeja. It was also Rahul Dravid's last assignment as coach.
85. (a) Goods and Services Tax (GST) Day, observed annually on July 1, commemorates the implementation of India's transformative tax system. The 2024 celebration marks the seventh anniversary of GST, introduced to simplify the complex tax structure previously managed by central and state governments. GST revolutionized India's fiscal landscape, significantly impacting the economy by streamlining indirect taxes and fostering economic efficiency.
86. (a) Gautam Gambhir, a former Indian cricketer, has been appointed as the head coach of the Indian men's cricket team, replacing Rahul Dravid. Announced by BCCI Secretary Jay Shah on July 9, 2024, Gambhir's term will last three years. He will oversee the team in key tournaments like the 2026 T20 World Cup, 2027 ODI World Cup, and 2025 ICC Champions Trophy. Gambhir starts his role in July with a tour to Sri Lanka.
87. (d) India participated in the International Telecommunication Union's (ITU) World Summit on the Information Society (WSIS)+20 Forum High-Level Event 2024 in Geneva, Switzerland. The WSIS+20 Forum commemorates 20 years since the WSIS, held

- in Geneva (2003) and Tunis (2005), and is co-organized by ITU, UNESCO, UNDP, and UNCTAD. Its aim is to address information and communication technology issues through a multi-stakeholder approach, fostering a people-centric, inclusive, and development-oriented Information Society.
88. (b) The 8th Japan-India Maritime Exercise (JIMEX-24) has commenced in Yokosuka, Japan. Hosted by the Japan Maritime Self-Defence Force (JMSDF), it features the Indian Navy's INS Shivalik and JMSDF's JS Yugiri. The exercise includes harbour and sea phases, focusing on naval interaction and warfighting skills, aiming to enhance interoperability and strengthen defense ties between Japan and India.
89. (c) **প্র্যাচিভার্স**
90. (b) The UNEP report "Raising Ambition, Accelerating Action: Towards Enhanced NDCs for Forests" highlights significant gaps in forest protection in current Nationally Determined Contributions (NDCs). From 2019-2023, tropical deforestation emitted 5.6 billion tonnes of CO₂ annually in the top 20 countries. Only 8 countries have quantified deforestation targets, and just 38% of UNFCCC Parties include forest conversion reduction measures. Agriculture and weak land-use policies are major deforestation drivers.
91. (d) The Department of Public Enterprises has bestowed Navratna status upon the Indian Renewable Energy Development Agency Limited (IREDA). Established in 1987 under the Ministry of New and Renewable Energy, IREDA functions as a Non-Banking Financial Institution. The Navratna status is awarded based on specific criteria including consistent high performance, such as achieving 'excellent' or 'very good' ratings in MoUs for three out of the last five years and a composite score of 60 or above in selected performance indicators.
92. (a) The Netherlands became India's third largest export destination in 2023-24, following the U.S. and UAE, despite a 3% dip in India's overall merchandise shipments. Key exports to the Netherlands included petroleum products (\$14.29 billion), electrical goods, chemicals, and pharmaceuticals. Consequently, India's trade surplus with the Netherlands rose to \$17.4 billion, up from \$13 billion in 2022-23, according to the Commerce Ministry data . **প্র্যাচিভার্স**
93. (b) The Compact Disc, or CD for short, is an optical disc used to store digital data. It was originally developed to store and play back sound recordings only, but the format was later adapted for storage of data (CD-ROM). Standard CDs have a diameter of 120 millimetres (4.7 in) and can hold up to 80 minutes of uncompressed audio or 700 MB (700 × 10⁶ bytes) of data.
94. (b) The World Wide Web (abbreviated as WWW or W3, commonly known as the Web), is a system of interlinked hypertext documents accessed via the Internet. Using concepts from his earlier hypertext systems like ENQUIRE, British engineer, computer scientist and at that time employee of CERN, Sir Tim Berners-Lee, now Director of the World Wide Web Consortium (W3C), wrote a proposal in March 1989 for what would eventually become the World Wide Web. **প্র্যাচিভার্স**
95. (d) A computer virus is a computer programme that can replicate itself and spread from one computer to another. The term "virus" is also commonly, but erroneously, used to refer to other types of malware, including but not limited to adware and spyware programs that do not have a reproductive ability. Malware includes computer viruses, computer worms, Trojan horses, most rootkits, spyware, dishonest adware and other malicious or unwanted software, including true viruses.
96. (c) In a computer, storage is the place where data is held in an electromagnetic or optical form for access by a computer processor. It is a technology consisting of computer components and recording media used to retain digital data. It is a core function and fundamental component of computers.
97. (c) Multimedia is media and content that uses a combination of different content forms. This contrasts with media that use only rudimentary computer displays such as text-only or traditional forms of printed or hand-produced material. Multimedia includes a combination of text, audio, still images, animation, video, or interactivity content forms. **প্র্যাচিভার্স**
98. (b) A Wide Area Network (WAN) is a network that covers a broad area (i.e., any telecommunications network that links across metropolitan, regional, or national boundaries) using private or public network transports. Business and government entities utilize WANs to relay data

among employees, clients, buyers, and suppliers from various geographical locations. In essence, this mode of telecommunication allows a business to effectively carry out its daily function regardless of location.

অ্যাচিভর্স

99. (a) Microsoft Outlook is a personal information manager from Microsoft, available as a part of the Microsoft Office suite. Although often used mainly as an email application, it also includes a

calendar, task manager, contact manager, note taking, a journal and web browsing.

অ্যাচিভর্স

100. (b) ENIAC was the first electronic general-purpose computer. It was Turing-complete, digital, and capable of being reprogrammed to solve a full range of computing problems. It was designed to calculate artillery firing tables for the United States Army's Ballistic Research Laboratory.

