

Q.1) Recently Central government has advised the physicians to prescribe generic drugs which has raised several issues and concern among doctors across the country. Consider the statements regarding Generic Drugs

1. It contain the same active ingredients as the innovator drug
2. They are bioequivalent to original brand
3. Generic drugs are less expensive because they are lower in quality

Select the correct code

- a) 1 and 2
- b) 2 and 3
- c) 1 and 3
- d) 1,2 and 3

Q.1) Solution (a)

Health professionals and consumers can be assured that FDA approved generic drugs have met the same rigid standards as the innovator drug. To gain FDA approval, a generic drug must:

- contain the same active ingredients as the innovator drug (inactive ingredients may vary)
- be identical in strength, dosage form, and route of administration
- have the same use indications
- be bioequivalent
- meet the same batch requirements for identity, strength, purity, and quality
- be manufactured under the same strict standards of FDA's good manufacturing practice regulations required for innovator products

Although generic drug active ingredients are chemically identical to their branded counterparts, they are typically sold at a cheaper price than the brand-name drug. Generics are less expensive because the drug manufacturer does not have to duplicate the original clinical trials for effectiveness and safety, which lowers the cost to bring the drug to market. Generics are not less expensive because they are lower in quality.

<http://www.thehindu.com/sci-tech/health/doctors-wary-as-centre-pushes-for-generic-drugs/article18227834.ece>

Q.2) Consider the following regarding Pneumonia

1. It is an inflammatory liver infection
2. Pneumonia is usually caused by infection with viruses or bacteria and less commonly by other microorganisms

3. Anti-pneumonia vaccine as part of the government's Universal Immunisation Programme (UIP)

Which of the given statements is/are correct?

- a) 1 and 2
- b) 2 and 3
- c) 1 and 3
- d) 1, 2 and 3

Q.2) Solution (b)

Pneumonia is an inflammatory condition of the lung affecting primarily the microscopic air sacs known as alveoli. Typical signs and symptoms include a varying severity and combination of productive or dry cough, chest pain, fever, and trouble breathing, depending on the underlying cause.

Pneumonia is usually caused by infection with viruses or bacteria and less commonly by other microorganisms, certain medications and conditions such as autoimmune diseases.

http://www.thehindu.com/news/national/govt-adds-anti-pneumonia-vaccine-to-uip/article18448001.ece?utm_source=RSS_Feed&utm_medium=RSS&utm_campaign=RSS_Syndication

Q.3) World's first quantum computing machine is developed by

- a) USA
- b) Russia
- c) China
- d) Japan

Q.3) Solution (c)

China's quantum computing machine is 24,000 times faster than its international counterparts and may dwarf the processing power of existing supercomputers

<http://www.livemint.com/Industry/i2yctKn7sQyqHglvOne3fN/China-builds-worlds-first-quantum-computing-machine.html>

Q.4) Consider the following

1. Sodium
2. Gold
3. Magnesium
4. Copper
5. Calcium
6. Platinum

Which of the above are found in nature as Free Elements?

- a) 1, 2 and 6
- b) 2, 3 and 5
- c) 2, 4 and 6
- d) 1, 2, 4, 5 and 6

Q.4) Solution (c)

Some metals are found in Free State and some in the form of their compounds. **Reactive elements** like Sodium, Potassium, Magnesium and Calcium are not found in nature as free elements.

Q.5) Choose the incorrect statement

- a) When a solid melts its temperature changes
- b) Water vapour at 100 degree Celsius have more energy than normal water at the same temperature
- c) Change in pressure can change the state of matter
- d) Both (a) and (b)

Q.5) Solution (a)

When a solid melts, its temperature doesn't change. The heat energy is used by the particles to overcome the force of attraction.

The primary difference is the state (water is liquid and where steam is gaseous form). Steam has more thermal energy than water because of latent heat of vaporization

The increase in pressure changes the state of matter from gas to liquid and also from liquid to solid. But increase in pressure alone cannot change the state of matter. Every gases and

liquid have certain temperature above which the application of pressure would not change the state of matter.

<http://www.dummies.com/how-to/content/why-temperature-remains-constant-during-a-phase-ch.html>

Q.6) Consider the following statements:

1. Orbital speed of a satellite is independent of its mass
2. Period of revolution of a satellite is independent of its mass
3. Escape velocity is independent of the mass, shape and size of the body and its direction of projection

Which of the statements given above is/are correct?

- a) 3 and 4 only
- b) 1, 2 and 3 only
- c) 1, 3 and 4 only
- d) All of the above

Q.6) Solution (d)

- Orbital speed of a satellite is independent of its mass. Hence satellites of different masses revolving in the orbit of same radius have same orbital speed.
- Orbital speed of a satellite depends upon the radius of orbit (height of satellite from the surface of earth). Greater the radius of orbit, lesser will be the orbital speed.

The orbital speed of a satellite revolving near the surface of earth is 7.9 km/sec

- Time taken by a satellite to complete one revolution in its orbit is called its period of revolution.
- Period of revolution of a satellite depends upon the height of satellite from the surface of earth. Greater the height more will be the period of revolution.
- However, period of revolution of a satellite is independent of its mass.
- The period of revolution of satellite revolving near the surface of earth is 1 hour 24 minute (84 minute)

Escape Velocity

Escape velocity on earth is the minimum velocity with which a body has to be projected vertically upwards from the earth's surface so that it just crosses the earth's gravitational field and never returns.

Escape velocity of any object

$$v_e = \sqrt{2GM / R}$$

$$= \sqrt{2gR} = \sqrt{8\pi\rho GR^2 / 3}$$

Escape velocity does not depend upon the mass or shape or size of the body as well as the direction of projection of the body.

Escape velocity at earth is 11.2 km / s.

Q.7) Consider the following statements

1. India is the largest producer of Natural Rubber in the world
2. Kerala is the leading producer of Rubber in India
3. India imports rubber from other countries

Select the correct code

- a) 1 and 2
- b) 2 and 3
- c) Only 2
- d) 1, 2 and 3

Q.7) Solution (b)

Thailand is the world's largest producer and exporter of natural rubber accounting for about one-third of world supply. Almost 90% rubber is for export because in Thailand, rubber brings in more money from exports than rice.

Kerala is the largest producer of natural rubber. India's annual demand for natural rubber is more than 10 lakh tonnes, while the domestic production is stagnant at about 5 lakh tonnes.

Q.8) Which among the following waves are examples of Electromagnetic waves?

1. X-rays
2. Gamma-rays
3. α -rays
4. β -rays
5. Ultrasonic wave

Choose the appropriate code:

- a) 1, 2, 3 and 4 only
- b) 1 and 2 only
- c) 1 and 5 only
- d) 1, 2 and 5 only

Q.8) Solution (b)

- Electromagnetic waves or non-mechanical waves are those waves which do not require medium for their propagation i.e. which can propagate even through the vacuum are called non-mechanical wave.
- In other words, electromagnetic waves are waves which can travel through the vacuum of outer space. Mechanical waves, unlike electromagnetic waves, require the presence of a material medium in order to transport their energy from one location to another.
- Following waves are not electro-magnetic – 1) Cathode rays 2) α -rays 3) β -rays 4) Sound wave 5) Ultrasonic wave 6) Canal rays
- Some important Electromagnetic waves – 1) Gamma-rays 2) X-rays 3) UV rays 4) Visible radiation 5) Infrared rays 6) Radio waves

Q.9) Which of the following are illustrations of Total Internal Reflection?

1. LED light panels
2. Sparkling of diamond
3. Automotive rain sensors
4. Mirage and looming
5. Endoscope

Choose the appropriate code:

- a) 2, 3 and 5 only
- b) 2 and 5 only
- c) 1, 2, 4 and 5 only
- d) All of the above

Q.9) Solution (d)

Total Internal Reflection:

- If light is propagating from denser medium towards the rarer medium and angle of incidence is more than critical angle, then the light incident on the boundary is reflected back in the denser medium, obeying the laws of reflection. This phenomenon is called total internal reflection as total light energy is reflected, no part is absorbed or transmitted.

Total internal reflection is the operating principle of optical fibers, which are used in endoscopes and telecommunications.

Total internal reflection is the operating principle of automotive rain sensors, which control automatic windscreen/windshield wipers.

Another application of total internal reflection is the spatial filtering of light.

Prisms in binoculars use total internal reflection, rather than reflective coatings, to fold optical paths and show erect images.

Some multi-touch screens use frustrated total internal reflection in combination with a camera and appropriate software to pick up multiple targets.

Gonioscopy employs total internal reflection to view the anatomical angle formed between the eye's cornea and iris.

A gait analysis instrument, CatWalk XT, uses frustrated total internal reflection in combination with a high speed camera to capture and analyze footprints of laboratory rodents.

Optical fingerprinting devices use frustrated total internal reflection in order to record an image of a person's fingerprint without the use of ink.

A total internal reflection fluorescence microscope uses the evanescent wave produced by TIR to excite fluorophores close to a surface. This is useful for the study of surface properties of biological samples.

Total internal reflection is the operating principle of LED Light Panels. This technology utilizes LGPs (Light Guide Plates) as the vehicle for transmitting light over large areas. By etching a grid pattern on the second surface of the LGP, frustrated total internal reflection occurs allowing the light to escape the LGP as visible illumination.

Diamonds shine brightly due to total internal reflection

For total internal reflection,

- 1) Light must be propagating from denser to rarer medium
- 2) Angle of incidence must exceed the critical angle

Q.10) Which among the following statements is/are true in regard to DNA and RNA?

1. Sugar is deoxyribose type in DNA, whereas sugar is just ribose type in RNA

2. DNA is double stranded structure, whereas RNA is single stranded structure
3. DNA is found in both nucleus and cytoplasm, RNA is found only in nucleus

Which of the statements given above is/are correct?

- a) 2 and 3 only
- b) 1 and 2 only
- c) 1 and 3 only
- d) All of the above

Q.10) Solution (b)

DNA is found mainly in nucleus, whereas RNA is found in both nucleus and cytoplasm

Q.11) Consider the following statements:

1. A black hole is a place in space where gravity pulls so much that even light cannot get out.
2. Density of black hole is very high.
3. Black holes are made when the fuel of a star gets over and it becomes a white dwarf.

Which of the above statements are correct?

- a) 1 and 2
- b) 2 and 3
- c) 1 and 3
- d) All of the above

Q.11) Solution (a)

A black hole is a place in space where gravity pulls so much that even light cannot get out. The gravity is so strong because matter has been squeezed into a tiny space. This can happen when a star is dying.

Because no light can get out, people can't see black holes. They are invisible. Space telescopes with special tools can help find black holes. The special tools can see how stars that are very close to black holes act differently than other stars.

Stellar black holes are made when the center of a very big star falls in upon itself, or collapses. When this happens, it causes a supernova. A supernova is an exploding star that blasts part of the star into space. Scientists think supermassive black holes were made at the same time as the galaxy they are in.

Small stars become white dwarfs when their fuel gets over.

Q.12) Consider the following w.r.t 'Semiconductors'

1. Semiconducting materials are always crystalline solids
2. Semiconductors are always manmade and properties are tweaked by Doping
3. A semiconductor is a material whose electrical conductivity decreases as the temperature increases

Select the *incorrect* code

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 Only
- d) All

Q.12) Solution (d)

Semiconductors are crystalline or amorphous solids with distinct electrical characteristics. Semiconductors are substances that only conduct electricity under certain conditions and include Silicon, Germanium, and sometimes tin. They are semiconductors that occur naturally and do not require any sort of chemical doping and can often be recognized by characteristic crystal lattice structures that they form.

A semiconductor is a material whose electrical conductivity increases with increasing temperature. This broad definition distinguishes semiconductors from metals, whose electrical conductivity decreases as the temperature increases. In general, there are two basic classifications of semiconductors: intrinsic semiconductors and extrinsic semiconductors. Unlike extrinsic semiconductors, intrinsic semiconductors are naturally occurring elements within nature. The defining characteristic of these intrinsic semiconductor elements is their four valence electrons each occupying a different orbital.

Q.13) Identify the correct statement regarding Chromosomes

- a) It contains DNA, RNA and protein
- b) It contains RNA and protein
- c) It contains DNA and protein
- d) It contains only DNA

Q.13) Solution (c)

Chromosomes are thread-like structures located inside the nucleus of animal and plant cells. Each chromosome is made of protein and a single molecule of deoxyribonucleic acid (DNA). Passed from parents to offspring, DNA contains the specific instructions that make each type of living creature unique.

Q.14) Consider the following about Reverse Osmosis

1. It is the spontaneous net movement of solvent molecules through a semi-permeable membrane into a region of higher solute concentration
2. It is the process of forcing a solvent from a region of high solute concentration through a semipermeable membrane to a region of low solute concentration by applying a pressure in excess of the osmotic pressure
3. Reverse osmosis finds application in waste water treatment and desalinization of brackish water

Select the correct code

- a) 1 and 3
- b) 2 and 3
- c) 1, 2 and 3
- d) Only 3

Q.14) Solution (b)

Osmosis is a natural process. When two solutions with different concentrations of a solute are separated by a semipermeable membrane, the solvent has a tendency to move from low to high solute concentrations for chemical potential equilibration.

Formally, reverse osmosis is the process of forcing a solvent from a region of high solute concentration through a semipermeable membrane to a region of low solute concentration by applying a pressure in excess of the osmotic pressure. The largest and most important application of reverse osmosis is the separation of pure water from seawater and brackish waters; seawater or brackish water is pressurized against one surface of the membrane, causing transport of salt-depleted water across the membrane and emergence of potable drinking water from the low-pressure side.

Q.15) Consider the statements and identify the correct one

- a) Dark Web and Deep Web are indexed on search engines
- b) Darknet is another name for Deep Web
- c) Deep Web is the area of the Internet which is not accessible through search engines.
- d) Dark Web is not part of the Deep Web

Q.15) Solution (c)

Dark Web is the virtual equivalent of a black market. Like Silk Road that marketed illegal drugs through the Dark Web, entities which want to operate out of the arms of the law seek refuge in the Dark Web.

Deep Web is the area of the Internet which is not accessible through search engines. What we access through search engines is called Surface Web. To get into the Deep Web one should know the right address. **Dark Web is part of the Deep Web. Darknet is another name for Dark Web.**

The dark web is the World Wide Web content that exists on darknets, overlay networks which use the public Internet but require specific software, configurations or authorization to access.

The dark web forms a small part of the deep web, the part of the Web not indexed by search engines, although sometimes the term "deep web" is mistakenly used to refer specifically to the dark web.

http://www.thehindu.com/sci-tech/technology/internet/what-is-dark-web/article18485139.ece?utm_source=RSS_Feed&utm_medium=RSS&utm_campaign=RSS_Syndication

Q.16) Which of the following statements are correct about Brown dwarfs?

1. They are too large to be called planets
2. They are too small to be stars
3. They are very dim and cool compared with stars

Select the correct statements

- a) 1 and 2
- b) 2 and 3
- c) 1 and 3
- d) All of the above

Q.16) Solution (d)

Brown dwarfs are objects which are too large to be called planets and too small to be stars. They have masses that range between twice the mass of Jupiter and the lower mass limit for nuclear reactions (0.08 times the mass of our sun). Brown dwarfs are thought to form in the same way that stars do - from a collapsing cloud of gas and dust. However, as the cloud collapses, it does not form an object which is dense enough at its core to trigger nuclear

fusion. The conversion of hydrogen into helium by nuclear fusion is what fuels a star and causes it to shine. Brown dwarfs were only a theoretical concept until they were first discovered in 1995. It is now thought that there might be as many brown dwarfs as there are stars.

Brown dwarfs are very dim and cool compared with stars. The best hope for finding brown dwarfs is in using infrared telescopes, which can detect the heat from these objects even though they are too cool to radiate visible light. Many brown dwarfs have also been discovered embedded in large clouds of gas and dust. Since infrared radiation can penetrate through the dusty regions of space, brown dwarfs can be discovered by infrared telescopes, even deep within thick clouds.

The object, known as SDSS J0104+1535, is located 750 light years away in the constellation of Pisces. It is made of gas that is around 250 times purer than the Sun, hence consists of more than 99.99% hydrogen and helium.

Estimated to have formed about 10 billion years ago, measurements also suggest that it has a mass equivalent to 90 times that of Jupiter, making it the most massive brown dwarf found to date.

Source: <http://www.thehindu.com/todays-paper/tp-national/massive-brown-dwarf-750-light-years-away/article17669336.ece>

Q.17) Consider the following statements about Olive Ridley Turtles

1. They are found in India
2. They are the only turtles which display a unique mass nesting behaviour 'arribada'

Select the correct statements

- a) Only 1
- b) Only 2
- c) Both 1 and 2
- d) Neither 1 nor 2

Q.17) Solution (a)

Only two species of marine turtles display a unique mass nesting behavior. This behavior is known as an 'arribada'. This reproductive phenomenon was first observed by the scientific community in 1961. By producing large numbers of offspring most organisms like sea turtles can insure their survival even after predation occurs.

Arribada- Spanish term meaning arrival; a mass nesting behavior.

An arribada is a unique nesting phenomenon common to both the Olive ridley and the Kemp's ridley sea turtle. The Olive ridley is endemic to the Pacific coasts of Mexico, Central America, and India. It is known to be a nocturnal nester. The Kemp's ridley is endemic to the Gulf of Mexico. It ranges from Galveston, Texas to Tampico, Mexico. Kemp's ridley turtles display unique diurnal arribadas.

Kemp's ridley distribution –

https://en.wikipedia.org/wiki/File:Lieux_pontes_tortue_de_kemp.png

Olive ridley distribution –

https://en.wikipedia.org/wiki/File:Lieux_pontes_tortue_olivatre.png

Q.18) Camp Lemonnier is located in which of the following countries?

- a) Cuba
- b) Gibraltar
- c) Djibouti
- d) Indonesia

Q.18) Solution (c)

China is constructing its first overseas military base in Djibouti and it is located just a few miles from Camp Lemonnier, one of Washington's largest installations.

Camp Lemonnier was established after the terrorist attack of Sept. 11, 2001, is the only permanent U.S. military installation in Africa.

Q.19) Which of the following statements is correct about Operation Raddul Fassad?

- a) A counter terrorism operation launched by Pakistani security forces
- b) A cross-border operation by the Turkish military and allied Syrian opposition groups in the Syrian Civil War
- c) Jordan military's operational name for the military intervention against the Islamic State of Iraq and Syria
- d) None of the above

Q.19) Solution (a)

In the backdrop of the rising terrorist attack, the Pakistani security forces launched a counter terrorism operation called Operation Raddul Fasad (Elimination of Mischief) against terrorists and extremists.

Q.20) Consider the following statements about Khejri tree

1. It is the state tree of Rajasthan and Telangana
2. It helps in sustaining the nutrient value of the soil and ensuring a good yield

Select the correct statements

- a) Only 1
- b) Only 2
- c) Both 1 and 2
- d) Neither 1 nor 2

Q.20) Solution (c)

Prosopis cineraria is a species of flowering tree in the pea family, Fabaceae. It is native to arid portions of Western Asia and the Indian Subcontinent, including Afghanistan, Iran, India, Oman, Pakistan, Saudi Arabia, the United Arab Emirates, and Yemen. It is an established introduced species in parts of Southeast Asia, including Indonesia.

It is the state tree of Rajasthan and Telangana in India. It is also the national tree of the United Arab Emirates.

Go through the article once - <http://indianexpress.com/article/research/khejri-the-tree-that-inspired-chipko-movement-is-dying-a-slow-death-4409701/>

Q.21) Consider the following statements about Indian Sign Language (ISL) dictionary

1. It is being developed by the Indian Sign Language Research and Training Centre (ISLRTC)
2. The dictionary is being developed in both print and video formats
3. ISLRTC is under the aegis of the Department of Empowerment of Persons with Disabilities, Ministry of Social Justice & Empowerment

Select the correct statements

- a) 1 and 2
- b) 2 and 3
- c) 1 and 3
- d) All of the above

Q.21) Solution (d)

Indian Sign Language Research and Training Centre (ISLRTC) is set up as a Society under the Societies Registration Act, 1860.

It is under the aegis of the Department of Empowerment of Persons with Disabilities, Ministry of Social Justice & Empowerment

The Indian Sign Language (ISL) dictionary, which is being developed by the Indian Sign Language Research and Training Centre (ISLRTC), has so far compiled 6,032 Hindi and English words and corresponding graphic representations of signs. The dictionary is being developed in both print and video formats.

It will contain graphic representations of popular signs used by the hearing impaired and will also include regional variations. Apart from that, it will have legal, technical and medical terms.

Read More - <http://pib.nic.in/newsite/mbErel.aspx?reid=127079>

Source: <http://www.thehindu.com/todays-paper/tp-national/sign-language-dictionary-to-release-in-india-soon/article17548183.ece>

Q.22) Which of the following sea does not have a land boundary?

- a) Sargasso Sea
- b) Laptev Sea
- c) Kara Sea
- d) Weddell Sea

Q.22) Solution (a)

The Sargasso Sea is a region of the North Atlantic Ocean bounded by four currents, that together form a circulating ocean stream called a gyre. It is the only such oceanic region on Earth to which the term sea has been extended, all others being bound entirely or mostly by land.

Q.23) Consider the following statements about 'Currency Chest'

1. They are branches of selected banks authorised by the RBI to stock rupee notes and coins
2. Co-operative banks are not authorised by RBI as 'Currency chests'

Which of the following statements is/are correct?

- a) Only 1
- b) Only 2
- c) Both 1 and 2
- d) Neither 1 nor 2

Q.23) Solution (a)

Currency chests are branches of selected banks authorised by the RBI to stock rupee notes and coins. The responsibility for managing the currency in circulation is vested in the RBI.

The central bank advises the Centre on the number of notes to be printed, the currency denominations, security features and so on. The number of notes that need to be printed is determined using a statistical model that takes the pace of economic growth, rate of inflation and the replacement rate of soiled notes. The Government has, however, reserved the right to determine the amount of coins that have to be minted.

The RBI offices in various cities receive the notes from note presses and coins from the mints. These are sent to the currency chests and small coin depots from where they are distributed to bank branches. The RBI has set up over 4,075 currency chests all over the country. Besides these, there are around 3,746 bank branches that act as small coin depots to stock small coins.

Of the 4,075 currency chests in the country, 2,722 or 67 per cent are held in branches of the State Bank of India and its associate banks. Other Nationalised banks hold 1,173 chests, taking the share of the PSU banks to 95 per cent. Private sector banks (160), Co-operative banks (3) and foreign banks (4), regional rural banks (5) do not have a large role to play in stocking currency on behalf of RBI.

Source: <http://www.thehindubusinessline.com/opinion/columns/all-you-wanted-to-know-about-currency-chest/article9370930.ece>

Q.24) The world's first fluorescent frog has been discovered in

- a) Guatemala

- b) Argentina
- c) Chile
- d) Ecuador

Q.24) Solution (b)

The world's first fluorescent frog has been discovered near Santa Fe in Argentina.

In normal light the frog appears to have a dull, mottled brownish-green skin with red dots, but under UV light it glows a bright fluorescent green.

Fluorescence – the ability to absorb light at short wavelengths and re-emit it at longer wavelengths – is uncommon in creatures that live on land.

The translucent frog was found to use a combination of lymph and glandular emissions to fluoresce.

The compound causing the blue-green glow of the polka-dot tree frog was not previously thought to exist in vertebrates.

This is very different from fluorophores found in other vertebrates, which are usually proteins or polyenic chains.

The discovery opens up the possibility that other amphibians may be able to fluoresce, particularly those with translucent skin similar to that of the tree frog.

Q.25) Consider the following

1. In total, there are eight main blood groups
2. Blood group O is the most common blood group and called universal donor
3. The universal plasma donor has Type O blood type.

Which of the given statements is/are correct?

- a) 1 and 2
- b) 2 and 3
- c) Only 2
- d) 1, 2 and 3

Q.25) Solution (a)

Red blood cells sometimes have another antigen, a protein known as the RhD antigen. If this is present, your blood group is RhD positive. If it's absent, your blood group is RhD negative.

This means you can be one of eight blood groups:

- A RhD positive (A+)
- A RhD negative (A-)
- B RhD positive (B+)
- B RhD negative (B-)
- RhD positive (O+)
- RhD negative (O-)
- AB RhD positive (AB+)
- AB RhD negative (AB-)

In general, Rh negative blood is given to Rh-negative patients, and Rh positive blood or Rh negative blood may be given to Rh positive patients. The universal red cell donor has Type O negative blood type. The universal plasma donor has Type AB blood type.

In transfusions of packed red blood cells, individuals with type O Rh D negative blood are often called universal donors. Those with type AB Rh D positive blood are called universal recipients.

