



30 Days Revision Module Day 28 - General Science (UPSC Prelims 2021)

1) Consider the following statements:

1. It is a tropical disease characterised by irregular fever, weight loss, anaemia and swelling of the spleen and liver.
2. It is caused by a protozoan and is transmitted to humans by the bite of infected female sandflies.
3. India accounts for about two-thirds of the total global cases.
4. The disease is endemic to Bihar, Jharkhand, Uttar Pradesh and West Bengal.
5. WHO has set 2023 as a deadline to eliminate it as a public health problem from the South East Asian region.

Which of the following diseases is best explained in the above given statements?

- a. Amoebiasis
- b. Malaria
- c. Visceral leishmaniasis
- d. Pneumonia

Answer : c

- Kala-azar or visceral leishmaniasis (VL) is a tropical disease characterised by irregular fever, weight loss, anaemia and swelling of the spleen and liver.
- It is caused by a protozoan Leishmania parasite and is transmitted to humans by the bite of infected female sandflies.
- According to the World Health Organisation (WHO), globally, about 7 to 10 lakh new cases occur annually. And India accounts for about two-thirds of the total global cases.
- The disease is endemic to the states of Bihar, Jharkhand, Uttar Pradesh and West Bengal.
- An initiative was launched by WHO to eliminate VL as a public health problem from the South East Asia region by 2020. The deadline has now been extended to 2023.

2) Which of the given statements is **not correct** about Plasma in the human blood

- a. Plasma is the dark, red-coloured liquid portion of blood.
- b. Plasma is a transporting medium for cells and a variety of substances vital to the human body
- c. Plasma carries out a variety of functions in the body, including clotting blood, fighting diseases and other critical functions.
- d. Source plasma is plasma that is collected from healthy, voluntary donors through a process called plasmapheresis.

Answer : a

- Plasma is the clear, straw-colored liquid portion of blood that remains after red blood cells, white blood cells, platelets and other cellular components are removed.
- It is the single largest component of human blood, comprising about 55 percent, and contains water, salts, enzymes, antibodies and other proteins.
- Composed of 90% water, plasma is a transporting medium for cells and a variety of substances vital to the human body.
- Plasma carries out a variety of functions in the body, including clotting blood, fighting diseases and other critical functions.

- Plasma serves as a transport medium for delivering nutrients to the cells of the various organs of the body and for transporting waste products derived from cellular metabolism to the kidneys, liver, and lungs for excretion. It is also a transport system for blood cells, and it plays a critical role in maintaining normal blood pressure.
- Plasma helps to distribute heat throughout the body and to maintain homeostasis, or biological stability, including acid-base balance in the blood and body.
- Source plasma is plasma that is collected from healthy, voluntary donors through a process called plasmapheresis and is used exclusively for further manufacturing into final therapies (fractionation).
- Source plasma donors may be compensated for their time and effort.
- Recovered plasma is collected through whole blood donation in which plasma is separated from its cellular components. Recovered plasma may be used for fractionation.

3) Consider the following:

1. Alcoholic beverages
2. Bread
3. Sauerkraut
4. Apple cider vinegar

Fermentation is used in the production of which of the above products?

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

Answer : d

- Fermentation is an anaerobic biological process that converts sugars and starches into simpler substances.
- In baking, it causes yeast and bacteria to convert sugars into carbon dioxide, among other things. This is what causes the dough to rise in bread.
- Apple cider vinegar is made by crushing apples, then squeezing out the juice. Bacteria and yeast are added to the liquid to start the alcoholic fermentation process, which converts the sugars to alcohol.
- In a second fermentation step, the alcohol is converted into vinegar by acetic acid-forming bacteria (*Acetobacter* species).
- Sauerkraut, a product resulting from the lactic acid fermentation of shredded cabbage, is literally acid (sour) cabbage.

4) With reference to the element 'Einsteinium' consider the following statements

1. Einsteinium has a half-life of 20 days.
2. Because of its high radioactivity and long half-life of all einsteinium isotopes, even if the element was present on Earth during its formation, it has most certainly decayed.
3. The element is not visible to the naked eye.

Which of the statements given above are correct?

- a. 1 only
- b. 2 only
- c. 1 and 3 only
- d. 1, 2 and 3

Answer : a

- The most common isotope of the element, einsteinium 253 has a half-life of 20 days.
- Because of its high radioactivity and short half-life of all einsteinium isotopes, even if the element was present on Earth during its formation, it has most certainly decayed. This is the

reason that it cannot be found in nature and needs to be manufactured using very precise and intense processes.

- Einsteinium (Es) is visible when enough quantity is assembled.

5) Which of the following statements is/are correct with reference to Plague

1. It is an infectious disease caused by the virus.
2. It can be transmitted between animals and humans only by the bite of infected fleas.
3. Bubonic plague is the most common form of plague.

Which of the statements given above is/are correct?

- a. 1 and 2 only
- b. 2 and 3 only
- c. 3 only
- d. 1, 2 and 3

Answer : c

- Plague is an infectious disease caused by *Yersinia pestis* bacteria, usually found in small mammals and their fleas.
- The disease is transmitted between animals via their fleas and, as it is a zoonotic bacterium, it can also transmit from animals to humans.
- Humans can be contaminated by the bite of infected fleas, through direct contact with infected materials, or by inhalation.
- Plague can be a very severe disease in people, particularly in its septicaemic and pneumonic forms, with a case-fatality ratio of 30% - 100% if left untreated.
- Bubonic plague is one of three types of plague caused by the plague bacterium (*Yersinia pestis*). One to seven days after exposure to the bacteria, flu-like symptoms develop. These symptoms include fever, headaches, and vomiting. This is the most common type.
- It causes buboes, which are very swollen and painful lymph nodes under the arms, in the neck, or in the groin. Without treatment, the bacteria can spread to other parts of the body.

6) Which of the following is not an artificial sweetener?

- a. ASPARTAME
- b. Sucralose
- c. Sucrose
- d. Alitame

Answer : c

- Sucrose, commonly known as "table sugar" or "cane sugar", is a carbohydrate formed from the combination of glucose and fructose. It is a natural sugar.

7) With reference to the sound waves, consider the following statements:

1. Sound waves do not need any medium and can travel in vacuum also.
2. Sound waves are longitudinal waves.
3. In sound wave propagation, the particles do not move from one place to another, but they simply oscillate back and forth about their position of rest.

Which of the statements given above is/are correct?

- a. 2 and 3 only
- b. 1 and 2 only
- c. 3 only
- d. 1, 2 and 3

Answer : a

- Sound waves cannot travel through a vacuum.
- It is longitudinal waves that the propagation of vibration of particles is parallel to the direction of the energy wave propagation.
- When the atoms are set in vibration they move back and forth. This continuous back and forth motion results in a high pressure and low pressure region in the medium.

8) Which of the following are the examples of Physical change?

1. Crystallization of sodium chloride
2. Boiling of water
3. Rusting of Iron
4. Curd formation from milk
5. Dissolution of sugar in water

Select the correct answer using the code given below.

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

Answer : c

Physical Change

- During a physical change, neither a composition nor the chemical nature of matter is changed.
- During the changes, molecule rearranges themselves without affecting the internal composition.
- It doesn't affect the chemical property.
- Examples of physical changes are Ice cubes, sublimation of iodine and salt, melting of gold, etc

Chemical Change

- It is a type of change where the chemical properties of matter change.
- The substance shows variation the reactive.
- It leads to breaking or making of bonds.
- The bond between the molecule changes and the composition of the substances change.
- Examples of chemical change are rusting of iron, burning of fuels, explosion reaction of sodium with water, etc

9) Consider the following pairs:

Acid		Found in
1. Acetic acid	-	Oranges and lemon
2. Lactic acid	-	Curd
3. Oxalic acid	-	Spinach
4. Ascorbic acid	-	Tamarind

Which of the above given pairs are correctly matched?

- a. 1 and 3 only
- b. 2 and 3 only
- c. 1 and 4 only
- d. 2 and 4 only

Answer : b

- Acetic acid is found in vinegar while orange lemons and other citrus fruits possess ascorbic acid and citric acid.
- Lactic acid is present in milk and milk related dairy products which give the milk the property of perishability.
- Oxalic acid is present as natural product in spinach at the maximum limits above which it is also present in rhubarb which makes it poisonous.
- Tartaric acid is present in tamarind, grapes and unripe mangoes giving it a sour yet refreshing taste.

10) Consider the following statements about the Dry Ice

1. It is the solid form of Carbon Monoxide.
2. It has a lower temperature than that of water ice.
3. It is useful for preserving food items where mechanical cooling is unavailable.

Which of the statements given above is/are correct?

- a. 1 and 2 only
- b. 2 and 3 only
- c. 1 and 3 only
- d. 2 only

Answer : b

- Dry ice is carbon dioxide in solid form sublimated directly from gaseous phase of carbon dioxide.
- Carbon dioxide is gas at room temperature and it freezes to become solid at much lower temperatures than water ice at minus 78 degrees Celsius.
- It has been used from Greek times for preserving food in both chilled and frozen state without availability of mechanical cooling.

11) Which of the following causes Pneumonia?

1. Virus
2. Bacteria
3. Fungi

Select the correct answer from the code given below:

- a. 1 only
- b. 1 and 2 only
- c. 2 and 3 only
- d. 1, 2 and 3

Answer : d

Causes of Pneumonia

- Bacteria, viruses, or fungi can cause pneumonia.

Common causes include:

- Flu viruses
- Cold viruses
- RSV virus (the top cause of pneumonia in babies age 1 or younger)
- Bacteria called Streptococcus pneumoniae and Mycoplasma pneumonia

12) Consider the following statements about the “Convalescent Plasma Therapy” which sometimes seen in the news recently:

1. It involves the use of plasma from people who have recovered from the infection to aid the immune response of those still fighting it.
2. The common adverse reaction of this therapy is transfusion related events.
3. It will increase the cytokine storm in the infected person.

Which of the statements given above is/are correct?

- a. 3 only
- b. 2 and 3 only
- c. 1 and 2 only
- d. 1, 2 and 3

Answer : c

- Convalescent plasma therapy uses blood from people who've recovered from an illness to help others recover.
- Some people may have mild complications or none at all. Other people may have severe or life-threatening complications.
- Plasma from healthy donors provides neutralizing antibodies, limiting viral amplification and immunomodulatory effects via the infusion of anti-inflammatory cytokines and antibodies that block complement, inflammatory cytokines, and autoantibodies.

13) Which of the following metals can be found in the earth crust in their free state?

1. Gold
2. Silver
3. Copper
4. Aluminium
5. Iron



Select the correct answer using the code given below.

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

Answer : a

- Metals occur in nature in two types
 - Metals which are generally non-reactive with air, remain the same after being mined out, while metals which react with air and either form oxides or decompose.
 - Metals, solid in nature, found in the earth’s crust is called minerals. They are mostly solid in nature but can be present as liquid mineral like mercury at room temperature.



14) “As light waves enter a glass prism their energies are absorbed by the glass. As the energy moves through the glass it moves at different speeds. Because of the angle of resulting refraction, the different color light waves separate or disperse.”

The above phenomenon can be best explained by which of the following?

- a. Polarisation of wave
- b. Diffraction
- c. Dispersion

d. Total Internal Reflection

Answer : c

- The separation of visible light into its different colors is known as dispersion. Visible light, also known as white light, consists of a collection of component colors.
- These colors are often observed as light passes through a triangular prism. Upon passage through the prism, the white light is separated into its component colors - red, orange, yellow, green, blue and violet.

15) Consider the following statements about Diphtheria

1. It is a viral disease caused by Corynevirae diphtheria
2. It affects the brain and related neuromuscular system
3. Diphtheria is a vaccine-preventable disease
4. There is an increasing trend in the number of cases of diphtheria globally

Which of the following statements given above are correct?

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

Answer : b

- Diphtheria is an infectious disease caused by a *Corynebacterium diphtheriae* bacterium which is spread from person to person through coughing and sneezing.
- Diphtheria can infect the respiratory tract (parts of the body involved in breathing) and skin. In the respiratory tract, it causes a thick, gray coating to build up in the throat or nose.
- Diphtheria is a vaccine preventable disease. In fact it is a part of Mission Indradhanush.
- There is an increasing trend in the number of cases of diphtheria globally, as the number of cases in 2018 (16,651) was double the 1996–2017 average (8,105).

16) Consider the following statements with respect to Trans Fats:

1. They are saturated fatty acids found both in natural as well as artificial forms.
2. They help to increase the shelf life of oils and foods and stabilize their flavours.
3. FSSAI is limiting trans fats to help India achieve a Trans fat-free target by 2022.

Which of the above-given statements is/are correct?

- a. 1 only
- b. 1 and 2 only
- c. 2 and 3 only
- d. 1 and 3 only

Answer : c

- Trans fats, or trans-fatty acids, are a form of unsaturated fat. They come in both natural and artificial forms.
- Natural, or ruminant, trans fats occur in the meat and dairy or is made through the chemical process of hydrogenation of oils ie addition of Hydrogen.
- Food Safety and Standards Authority of India (FSSAI) setting January 1, 2022 as the deadline for limiting trans-fat levels in food products and edible oils and fats to 2% from the current permissible limit of 5%.

17) Which of the following statements about Plant-derived Vaccines are correct?

1. It involves the production of vaccine antigens in genetically modified plants.
2. These vaccines are non-infectious and non-replicating.

3. It can be quickly produced in large quantities.
4. It can be produced cheaply in very large amounts.

Select the correct answer using the code given below.

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

Answer : d

- Plant derived vaccine involves the production of vaccine antigens in genetically modified plants which can then be extracted and purified by conventional methods.
- Such vaccines could either be eaten or applied to mucosal surfaces.
- Traditionally vaccines are prepared by using an attenuated version of the pathogen or by preparing and inactivating a disease-causing organism or a suitable part of it, e.g. a toxin,
- But Plant derived vaccines are non-infectious and non-replicating.
- Compared to traditional methods, which usually take up to six months before a vaccine candidate is identified, the living plant technology is quicker.
- It can be produced cheaply in very high amounts.

18) Consider the following statements with respect to Non-Alcoholic Fatty Liver Disease (NAFLD)

1. It is the abnormal accumulation of fat in the liver in the absence of secondary causes of fatty liver.
2. Kidney failure and Pneumonia are the most common cause of death in NAFLD.

Which of the statement(s) given above is/are **not correct**?

- a. 1 only
- b. 2 only
- c. Both 1 and 2
- d. Neither 1 nor 2



Answer : b

Non-Alcoholic Fatty Liver Disease (NAFLD)

- It is the abnormal accumulation of fat in the liver in the absence of secondary causes of fatty liver, such as harmful alcohol use, viral hepatitis, or medications.
- It is an independent predictor of future risk of cardiovascular diseases, type 2 diabetes and other metabolic syndromes.
- The cardiovascular disease is the most common cause of death in NAFLD.
- Recently, the Union Ministry of Health & Family Welfare has launched the Operational Guidelines for integration of NAFLD.

19) Consider the following statements with respect to Leprosy Disease

1. It is an incurable infectious disease caused by parasites.
2. India bears more than 50% of the global caseload of the disease.

Which of the statement(s) given above is/are **not correct**?

- a. 1 only
- b. 2 only
- c. Both 1 and 2
- d. Neither 1 nor 2

Answer : a

Leprosy Disease

- Leprosy disease is chronic, curable infectious disease mainly causing skin lesions and nerve damage.
- It is unique disease caused by the bacterium *Mycobacterium leprae*.
- It divides only once every two weeks, which makes it difficult to link exposures to the development of disease.
- Its incubation period ranges from a few months to 20 years and more in some cases.
- Moreover, the dead bacilli often linger in tissues for years, long after an individual has completed Multi drug therapy (MDT) treatment for a recommended period.
- India is home to the highest number of new cases of leprosy in the world.
- The World Health Organization data of the last 10 years reveals that the number of new cases in India reduced to 114,451 in 2019, from 126,800 in 2010.

20) With respect to Mucormycosis, consider the following statements:

1. It is a serious but rare bacterial infection caused by a group of molds called mucormycetes.
2. The bacteria that cause mucormycosis are present throughout the environment and are more common in soil than in air.

Which of the statement(s) given above is/are correct?

- a. 1 only
- b. 2 only
- c. Both 1 and 2
- d. Neither 1 nor 2



Answer : d

Mucormycosis

- It is also called Black Fungus or Zygomycosis and is a serious but rare fungal infection.
- It is caused by a group of molds called mucormycetes.
- Mucormycetes, the group of fungi that cause mucormycosis, are present throughout the environment, particularly in soil and in association with decaying organic matter, such as leaves, compost piles, and animal dung.
- They are more common in soil than in air, and in summer and fall than in winter or spring.
- It usually occurs in people who have health problems or take medicines that lower the body's ability to fight germs and sickness.
- It occurs through inhalation, inoculation, or ingestion of spores from the environment.
- It does not spread between people or between people and animals.
- It may led to loss of vision and brain damage that may lead to death of infected patient.