

## Chapter 8: Human Health and Diseases

NCERT Exemplar · Class 12 · Biology

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### Multiple Choice Questions

#### Question 1

The term 'Health' is defined in many ways. The most accurate definition of health would be:

A.

Health is the state of body and mind in a balanced condition

B.

Health is the reflection of a smiling face

C.

Health is a state of complete physical, mental and social well-being

D.

Health is the symbol of economic prosperity.

#### Answer

Correct option: C

#### Solution

Ans: Correct option is c.

Health is defined as a state of complete social, mental, and physical well-being that is free of sickness. Nutrition, lifestyle, environmental factors, and genetics are thought to be the key pillars of health. A person's health may be jeopardised if any of these are compromised. A well-balanced nutrient diet keeps a person healthy by providing all of the essential nutrients that the body requires. Environmental influences have an impact on an individual's health.

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## Question 2

The organisms which cause diseases in plants and animals are called:

**A.**

Pathogens

**B.**

Vectors

**C.**

Insects

**D.**

Worms

## Answer

Correct option: A

## Solution

Ans: Correct option is a

Pathogens are organisms that cause disease in both plants and animals. There are several forms of pathogens:

1. Viruses: These are not cells, but rather DNA or RNA segments. They're the ones who infect you with viruses. Retroviruses, human immunodeficiency viruses, and other viruses are examples.

Bacteria are single-celled microorganisms that cause bacterial infections. Streptococcus pneumonia, for example.

3. Fungi are eukaryotic organisms like moulds and yeast. Fungal infections are spread by them. Trichophyton and Aspergillus, for example.

4. Protozoa: These organisms are unicellular and include algae, amoeba, and Euglena, among others.

5. Worms, also known as Helminths, are parasitic creatures. Hookworm, threadworm, pinworm, flatworm, and roundworm are some of the types of worms.

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### Question 3

The clinical test that is used for diagnosis of typhoid is:

A.

ELISA

B.

ESR

C.

PCR

D.

Widal

### Answer

Correct option: D

### Solution

Ans: Correct option is d

ELISA is an Enzyme Linked Immunosorbent Assay which is used for many purposes including detection of many diseases, viruses and certain mutations.

ESR is Erythrocyte Sedimentation Rate which is used in diagnosis of various blood and systemic disorders.

PCR or Polymerase Chain Reaction is used in detection of various diseases at genetic level and for various other purposes.

Widal Test is used primarily for the diagnosis of typhoid in an individual with lesser fatal symptoms.

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### Question 4

Diseases are broadly grouped into infectious and non-infectious diseases. In the list given below, identify the infectious diseases.

i. Cancer

ii. Influenza

iii. Allergy

iv. Smallpox

A.

i and ii

B.

ii and iii

C.

iii and iv

D.

ii and iv

### Answer

Correct option: D

### Solution

Ans: Correct option is d.

Influenza is a viral infection caused by the influenza virus. The influenza virus is a highly contagious illness. It is spread through direct contact, the use of infected people's belongings, and droplets. High fever, runny nose, sore throat, muscle pains, headache, cough, sneezes, and exhaustion are all frequent symptoms.

Smallpox is caused by the Variola virus. It is a highly contagious disease with no known cure. Smallpox has been eradicated thanks to massive vaccination campaigns around the world.

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### Question 5

The sporozoites that cause infection when a female *Anopheles* mosquito bites a person, are formed in:

A.

liver of the person

B.

RBCs of mosquito

C.

salivary glands of the mosquito

D.

gut of the mosquito

### Answer

Correct option: C

### Solution

Ans: Correct option is c

1. When a female *Anopheles* mosquito bites an infected person, the sporozoites that carry malarial plasmodium cells enter the mosquito's gut.
2. It begins to replicate here and is stored in the salivary glands of the mosquito.
3. When a mosquito bites an uninfected person, the sporozoites reach the liver and begin to proliferate, causing the RBC to rupture and release a toxin called hemozoin, which causes fever, chills, and scarring.

### Question 6

The disease chikungunya is transmitted by:

**A.**

House fly

**B.**

Aedes mosquito

**C.**

Cockroach

**D.**

Female Anopheles

### Answer

Correct option: B

### Solution

Ans: Correct option is b

Chikungunya is transmitted to humans through infected mosquito bites. Chikungunya disease is caused by the chikungunya virus, which is spread by Aedes mosquitoes. The most common indicators of infection are fever and joint pain. Other symptoms may include a headache, muscular soreness, joint swelling, or a rash.

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### Question 7

Many diseases can be diagnosed by observing the symptoms in the patient. Which group of symptoms are indicative of pneumonia?

**A.**

Difficulty in respiration, fever, chills, cough, headache

**B.**

Constipation, abdominal pain, cramps, blood clots

**C.**

Nasal congestion and discharge, cough, constipation, headache

**D.**

High fever, weakness, stomach pain, loss of appetite and constipation.

### Answer

Correct option: A

### Solution

Ans: Correct option is a.

Pneumonia is a respiratory disease primarily presenting with symptoms of fever, chills, cough, headaches and a difficulty in breathing.

Amoebiasis is a parasitic disease affecting human intestines producing symptoms like constipation, abdominal pain, blood clots and cramps.

Influenza is another respiratory disease which presents as nasal congestion, discharge, headache and cough.

Typhoid is a fatal disease which presents with high fever, stomach pain, weakness, appetite loss, constipation accompanied with weakness.

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### Question 8

**Cancer-causing genes are called:**

**A.**

Structural genes

**B.**

Expressor genes

**C.**

Oncogenes

**D.**

Regulatory gene

### Answer

Correct option: C

### Solution

Ans: Correct option is c

Oncogenes are cells that can turn a healthy cell into a cancerous one. These genes usually have a component in them which can turn cancerous on exposure to a carcinogenic substance.

Except for regulatory proteins, structural genes code for RNA and other proteins. Regulatory genes are the genes that control the expression of other genes.

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### Question 9

**In malignant tumours, the cells proliferate, grow rapidly and move to other parts of the body to form new tumours. This stage of the disease is called:**

**A.**

Metagenesis

**B.**

Metastasis

**C.**

Teratogenesis

**D.**

Mitosis

## Answer

Correct option: B

## Solution

Ans: Correct option is b

| Sr No | Tumours       | Definition                                                                                                                  |
|-------|---------------|-----------------------------------------------------------------------------------------------------------------------------|
| 1     | Metagenesis   | In an organism, the reproduction cycle alternates between sexual and asexual are known as metagenesis.                      |
| 2     | Metastasis    | In malignant tumours, the cells proliferate, grow very fastly and move towards other parts of the body to form new tumours. |
| 3     | Teratogenesis | It is the process by which congenital or birth defects take place in the foetus.                                            |
| 4     | Mitosis       | Cell division in which two daughter cells are formed having the same number of chromosomes.                                 |

## Question 10

When an apparently healthy person is diagnosed as unhealthy by a psychiatrist, the reason could be that:

**A.**

The patient was not efficient at his work

**B.**

The patient was not economically prosperous

**C.**

The patient shows behavioural and social maladjustment

**D.**

He does not take interest in sports

### Answer

Correct option: C

### Solution

Ans: Correct option is c

If a seemingly healthy person is labelled as unwell by a psychiatrist, the cause could be that the patient exhibits behavioural and social maladjustment. Extreme thirst, dehydration, or hunger, weight loss without effort or abnormal weight loss, a want to binge eat excessively, a desire to vomit on purpose, or a desire to starve (not eat at all). A preoccupation with food and weight, as well as a distorted body image, are also present. When body temperature deviates from its typical range, it can be an indication of acute or chronic disease, as well as signal specific health issues. This will be the root of people who are physically unfit.

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### Question 11

Which of the following are the reason(s) for Rheumatoid arthritis? Choose the Correct option.

- i. The ability to differentiate pathogens or foreign molecules from self-cells increases.
- ii. Body attacks self-cells
- iii. More antibodies are produced in the body
- iv. The ability to differentiate pathogens or foreign molecules from self-cells is lost

**A.**

i and ii,

**B.**

ii and iv,

**C.**

iii and iv,

**D.**

i and iii

### Answer

Correct option: B

### Solution

Ans: Correct option is b.

Chronic pain is rheumatoid arthritis owing to inflammation simultaneously of multiple joint synovial membranes. It often begins in the tiny joints in the hand and asymmetrically progressive and centripetal. It entails joint erosion. This leads to more active lymphocytes and a loss of the bodily cells' capacity to distinguish between themselves and foreign cells. The lymphocytes begin to attack the cells of the body. For which the ability to differentiate pathogens or foreign molecules are easy.

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### Question 12

**AIDS is caused by HIV. Among the following, which one is not a mode of transmission of HIV?**

**A.**

Transfusion of contaminated blood

**B.**

Sharing the infected needles

**C.**

Shaking hands with infected persons

**D.**

Sexual contact with infected persons

### Answer

Correct option: C

## Solution

Ans: Correct option is c.

HIV is the cause of AIDS in a person who has the virus after a certain incubation period. This virus can be transmitted through:

1. Contaminated blood transfusion.
2. Sharing infected needles with Iv users.
3. It can also be caused by unprotected sexual contact with infected person.
4. Exchange of saliva with an infected person.
5. Vertical transmission from mother to the child in womb.

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## Question 13

'Smack' is a drug obtained from the:

**A.**

Latex of Papaver somniferum

**B.**

Leaves of Cannabis sativa

**C.**

Flowers of Datura

**D.**

Fruits of Erythroxylum coca

## Answer

Correct option: A

## Solution

Ans: Correct option is a.

| Sr No | Drugs          | Obtained From                             |
|-------|----------------|-------------------------------------------|
| 1     | Smack (Heroin) | Lates of papaver somniferum (poppy plant) |
| 2     | Cannabis       | Leaves of cannabis sativa                 |
| 3     | Datura         | Flowers of Datura                         |
| 4     | Cocaine        | Fruits of Erythroxylum coca               |

## Question 14

The substance produced by a cell in viral infection that can protect other cells from further infection is:

**A.**

Serotonin

**B.**

Colostrum

**C.**

Interferon

**D.**

Histamine

## Answer

Correct option: C

## Solution

Ans: Correct option is c.

A. Serotonin is a monoamine neurotransmitter that has a role in feelings of well-being.

Colostrum is the first milk produced by the mammary glands after a baby is born. It contains antibodies that help the immune system of the newborn develop.

C. Interferon is a protein produced by a cell during viral infection that protects other cells from becoming infected. When a virus is present, the host cell produces interferon, which is a protein cocktail.

D. Histamine is a nitrogenous substance that plays a role in the immune system.

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## Question 15

**Transplantation of tissues/organs to save certain patients often fails due to rejection of such tissues/organs by the patient. Which type of**

**Is an immune response responsible for such rejections?**

**A.**

auto-immune response

**B.**

humoral immune response

**C.**

physiological immune response

**D.**

cell-mediated immune response

## Answer

Correct option: C

## Solution

Ans: Correct is option is c

Transplantation is the process of replacing an unhealthy organ in a person with a healthy one. Because they are regarded as foreign items by the body, these replacement organs are sometimes rejected by the immune system. T-Lymphocytes respond by launching a cell-mediated immune response. Because these lymphocytes attempt to distinguish between their own and alien cells, the transplant is occasionally rejected.

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## Question 16

**Antibodies present in colostrum that protect the new-born from certain diseases is of**

**A.**

Ig G type

**B.**

Ig A type

**C.**

Ig D type

**D.**

Ig E type

## Answer

Correct option: B

## Solution

Ans: Correct option is b

One of the antibodies contained in colostrum is IgA, also known as secretory immunoglobulin. It can be found in the gastrointestinal tract, respiratory system, and urogenital tract mucosal linings. In these systems, its goal is to prevent pathogenic infection.

**Question 17**

Tobacco consumption is known to stimulate the secretion of adrenaline and nor-adrenaline. The component causing this could be:

**A.**

Nicotine

**B.**

Tannic acid

**C.**

Curamin

**D.**

Catechin

**Answer**

Correct option: A

**Solution**

Ans: Correct option is A

Tobacco is a stimulant that is smoked and eaten as Gutkha, Jarda pan masala, and other meals. Nicotine is a type of alkaloid that has a stimulating effect on the central nervous system. This stimulates the adrenal gland to create adrenaline, which increases heart rate, alertness, and other symptoms. It also acts as a sedative by boosting the production of nor-adrenaline, which relaxes the mind and reduces anxiety.

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**Question 18**

Antivenom against snake poison contains:

**A.**

Antigens

**B.**

Antigen-antibody complexes

**C.**

Antibodies

**D.**

Enzymes

### Answer

Correct option: C

### Solution

Ans: Correct option is c

Snakes and spiders are milked for their venom, which is commonly obtained from various animals or snakes. Small doses of venom are injected into the animal, and the dose is gradually increased until the animal develops tolerance to the venom and the animal produces antibodies against the venom. These are obtained by isolating antibodies from the blood of animals. Antivenin is a medication that is used to treat dangerous bites and stings. The majority are administered intravenously; they just connect to the venom and neutralise it, preventing further harm but not reversing it. It should be given as soon as possible after the lethal bite has occurred. Because snake antivenom is complicated and expensive to develop, there is always a scarcity of these antivenoms.

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### Question 19

Which of the following is not lymphoid tissue?

**A.**

Spleen

**B.**

Tonsils

**C.**

Pancreas

**D.**

Thymus

### Answer

Correct option: C

### Solution

Ans: Correct option is c

All of the following organs are lymphoid tissue, with the exception of the pancreas, which is a mixed gland with both endocrine and exocrine glands. The pancreas is a stomach-based digestive organ. It plays a crucial role in converting the food we eat into energy for our cells. Exocrine digesting and endocrine blood sugar management are the two major activities of the pancreas.

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### Question 20

Which of the following glands is largely sized at birth but reduces in size with ageing?

**A.**

Pineal

**B.**

Pituitary

**C.**

Thymus

**D.**

Thyroid

### Answer

Correct option: C

### Solution

Ans: Correct option is c

Between the lungs, right in front of the sternum, is the thymus gland. This gland is enormous at birth and contributes in the development of T-lymphocytes. During puberty, it shrinks in size and is replaced by fat. The thymus is made up of immature T cells called thymocytes, as well as lining cells called epithelial cells, which help thymocytes develop. T cells that grow properly respond to MHC immune receptors in the body rather than bodily proteins (a process known as positive selection) (called negative selection). The thymus is the largest and most active during the neonatal and pre-adolescent years. The thymus has begun to shrink in size and function by early adolescence, and the thymus tissue has been gradually replaced by adipose tissue. Despite this, some T cell growth continues into adulthood.

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### Question 21

Haemozoin is a:

A.

precursor of haemoglobin

B.

toxin released from Streptococcus infected cells

C.

toxin released from Plasmodium-infected cells

D.

toxin released from Haemophilus infected cells

## Answer

Correct option: C

## Solution

Ans: Correct is option is c

Plasmodium parasites enter the human body as sporozoites (infectious forms) after being bitten by a female Anopheles mosquito infected with the parasite. The parasites multiply initially in the liver cells, then go on to the red blood cells (RBCs) and cause them to burst. RBC rupture is linked to the generation of hemozoin, a toxic substance that causes the cold and high fever that occurs every three to four days.

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## Question 22

Which of the following is not the causal organism for ringworm?

A.

Microsporum

B.

Trichophyton

C.

Epidermophyton

D.

Macrosporum

## Answer

Correct option: D

## Solution

Ans: Correct option is d

Ringworm creatures include Trichophyton, Epidermophyton, and Microsporum. Macrosporum is a disease-causing fungus. These macrosporum, also known as smooth black truffles, are a type of edible truffle belonging to the Tuberaceae family. The truffles are typically spherical to irregular in shape. The colour of its surface varies from reddish brown to rust to blackish. The number of warts on the fruit body surface is limited, giving the truffle a smooth appearance.

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### Question 23

A person with sickle cell anaemia is

A.

More prone to malaria

B.

More prone to typhoid

C.

Less prone to malaria

D.

Less prone to typhoid

### Answer

Correct option: C

### Solution

Ans: Correct option is c

Sickle cell anaemia is a genetic condition in which the beta Haemoglobin chain is substituted with Valine rather than Glutamic Acid. RBCs change shape from disc to sickle-like as a result of this mutation, resulting in lower oxygen levels in the body. People who have developed the sickle cell trait are also less susceptible to malaria.

## Very Short Answer Questions

### Question 1

**Certain pathogens are tissue/organ-specific. Justify the statement with suitable examples.**

#### Solution

Ans: Pathogens enter the body through a variety of routes. Certain pathogens become tissue or organ-specific as a result of their adaptation to the tissues or organ's resistance. Rhinovirus, for example, is a tissue-specific pathogen that infects the nose tube but not the lungs. The fungus that causes ringworm only affects the skin and not the rest of the body.

### Question 2

**The immune system of a person is suppressed. In the ELISA test, he was found positive for a pathogen.**

- Name the disease the patient is suffering from.**
- What is the causative organism?**
- Which cells of the body are affected by the pathogen?**

#### Solution

Ans: The condition is known as Acquired Immuno-Deficiency Syndrome (AIDS) (AIDS). The disease is transferred by sexual activity, needle sharing, and tattoo equipment sharing. It does not spread when you touch or sit next to the patient.

Ans: The causative organism is most likely the Human Immunodeficiency Virus (HIV), which affects the patient's tissue and cells. This is spread through bodily fluids like blood and sperm.

Ans: Helper T lymphocytes are the cells of the body that are affected.

### Question 3

**Where are B-cells and T-cells formed? How do they differ from each other?**

## Solution

Ans: In the bone marrow, cells such as B cells and T cells are generated. These cells are White Blood cells, which are important for the body's immunity. B cells mature in the bone marrow, whereas T cells mature in the Thymus. T cells help to kill the pathogen and other immune cells in the battle against infection, whereas B cells create antibodies.

## Question 4

Given below are the pairs of pathogens and the diseases caused by them. Which out of these is not a matching pair and why?

- (a) Virus                      common cold
- (b) Salmonella              typhoid
- (c) Microsporium            filariasis
- (d) Plasmodium              malaria

## Solution

Ans: Option C is erroneous because Microsporium causes ringworm, while Wucheria bancrofti causes filariasis.

Microsporium is a member of the Eurotiomycetes fungus family. Other fungal infections, such as tinea capitis, tinea corporis, and dermatophytosis, are caused by this. W.bancrofti, on the other hand, is a filarial worm that causes lymphatic filariasis by attacking the lymphatic system.

## Question 5

What would happen to the immune system, if the thymus gland is removed from the body of a person?

## Solution

Ans: The thymus gland, the major lymphoid organ, contributes in the development of T cells. The removal of the Thymus gland has no effect on the body's immunity because adequate T cells are created during the foetal stage. However, removing the Thymus gland while the baby is still in the

womb can result in a life-threatening condition. Thymus glands are made up of immature T cells that are surrounded by epithelial cells that help thymocytes develop.

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### Question 6

**Many microbial pathogens enter the gut of humans along with food. What are the preventive barriers to protect the body from such pathogens? What type of immunity do you observe in this case?**

### Solution

Ans: The epithelium lining is coated with mucus, which helps trap microorganisms entering the body. Saliva secreted in the mouth and hydrochloric acid secreted in the stomach also assist limit microbial growth.

Innate immunity is a term used to describe this form of immunity. It's a fast-acting defence against a foreign infection.

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### Question 7

**Why is mother's milk considered the most appropriate food for a new-born infant?**

### Solution

Ans: Colostrum is the mother's milk that is released shortly after the infant is born. It's high in antibiotics and nutrient-dense. It contains a high level of IgA, which aids the infant's illness defence. It's also high in minerals, vitamins, and proteins, among other things. It also increases immunity and aids in the infant's growth and development.

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### Question 8

**What are interferons? How do interferons check infection of new cells?**

### Solution

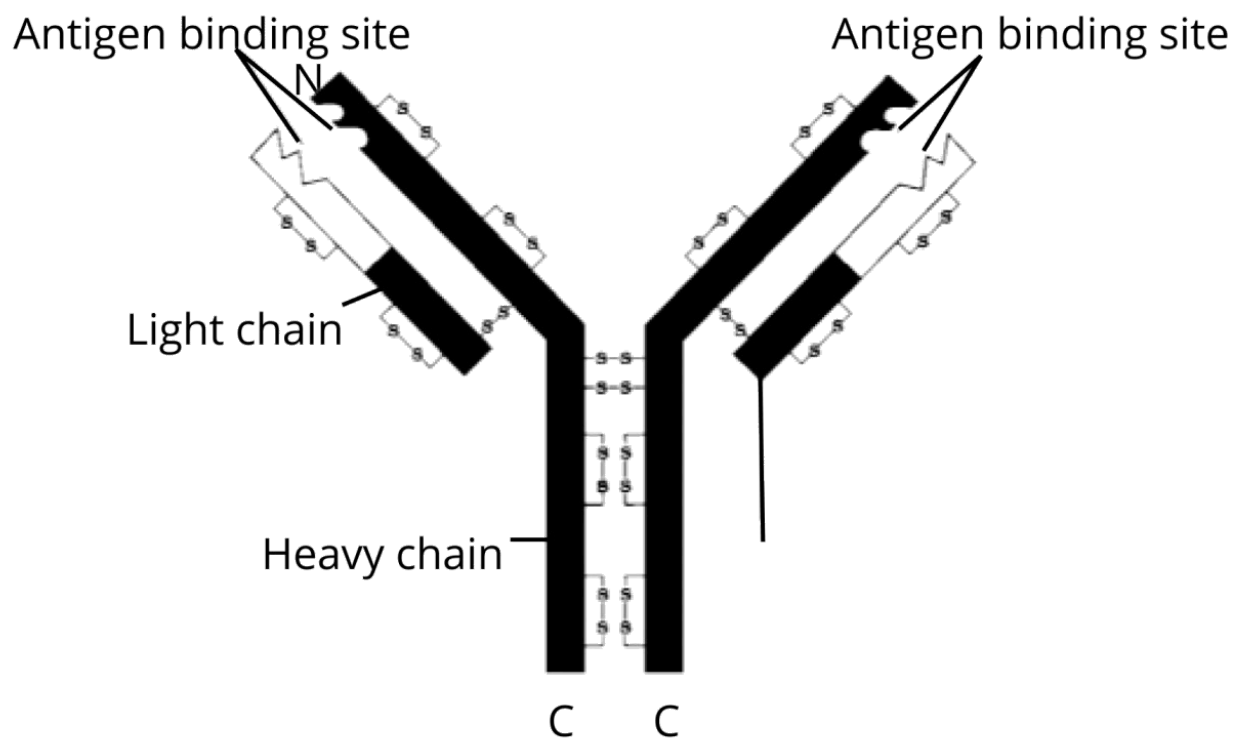
Ans: Interferons are a family of proteins that are released in response to a variety of viruses. This prevents the virus from multiplying as well as spreading. These shield the body from a variety of

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infections. They serve as a Cytokinin barrier in most cases. T cells and macrophages are the sources of interferons.

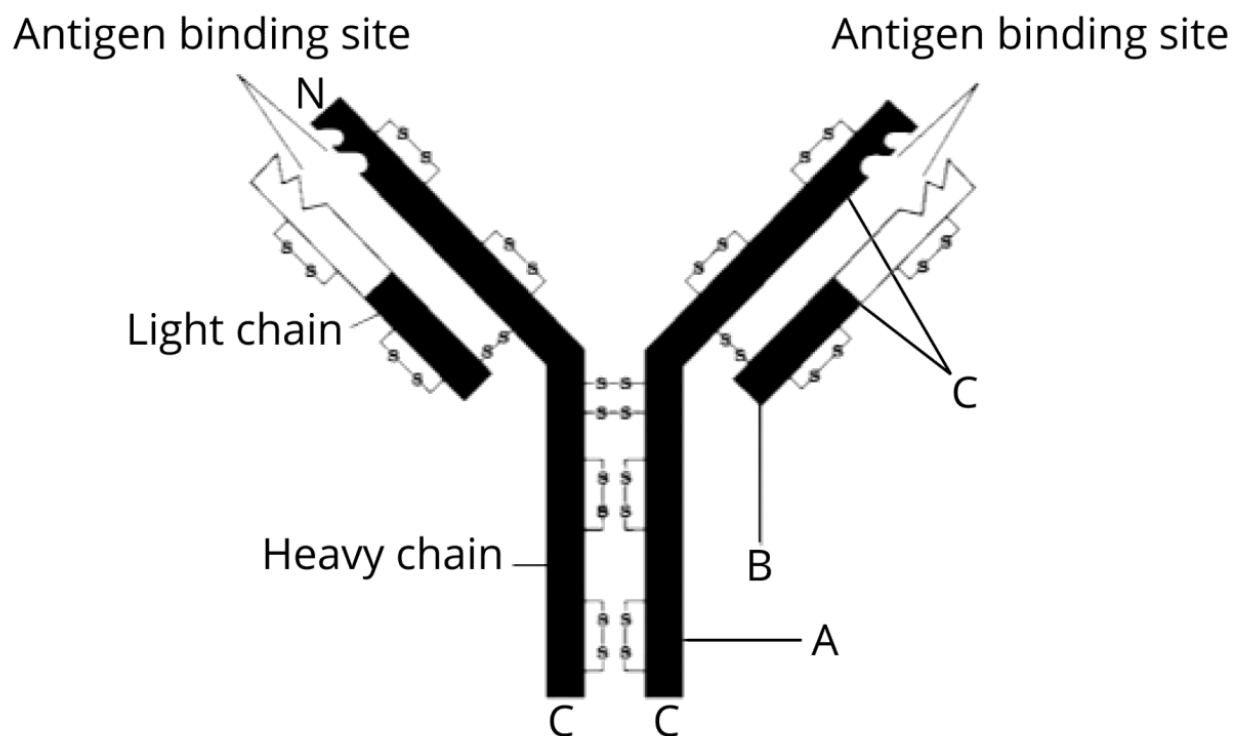
### Question 9

In the figure, the structure of an antibody molecule is shown. Name the parts A, B and C. Show A, B and C in the diagram.



### Solution

Ans:



An antigen-binding site is denoted by the letter A.

B refers to the zone of light.

The heavy region is C.

Two light chains, two heavy chains, and an antigen-binding site make up the antigen molecule.

Antigens include IgG, IgA, IgD, IgE, and others.

### Question 10

If a regular dose of drug or alcohol is not provided to an addicted person, he shows some withdrawal symptoms. List any four such withdrawal symptoms.

### Solution

Ans: The majority of withdrawal symptoms in a frequent drug or alcohol user include intense perspiration, anxiety, nausea, and shakiness. Because alcohol is not metabolised by the body, it circulates in the bloodstream and travels throughout the body. The brain is usually the first organ to be affected, followed by the kidneys, lungs, and liver. Excessive alcohol consumption can also lead to

serious health problems such as unexplained weight loss, liver enlargement, exhaustion, and appetite loss.

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### Question 11

**Why is it that during changing weather, one is advised to avoid close, crowded and air-conditioned places like cinema halls etc.?**

### Solution

Ans: Many viral illness germs are present in the air or float in the air during changing weather. Its presence is significantly stronger in enclosed spaces, such as movie theatres and air-conditioned areas. There are various ways to be infected by a virus that causes a common cold, fever, flu, and other illnesses. As a result, it's best to stay away from public places when the weather changes.

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### Question 12

**The harmful allele of sickle cell anaemia has not been eliminated from the human population. Such afflicted people derive some other benefit. Discuss.**

### Solution

Ans: Sickle Cell Anemia is a disorder in which the blood cells form a sickle shape before breaking down. It's an inherited condition that can only be healed by bone marrow transplants, which are also dangerous. Some patients with sickle cell anaemia benefit from the fact that they are less susceptible to malaria. According to a report from the Centers for Disease Control and Prevention in the United States, sickle cell disease is more common in malaria-endemic areas.

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### Question 13

**Lymph nodes are secondary lymphoid organs. Explain the role of lymph nodes in our immune response.**

## Solution

Ans: Lymph nodes include lymphocytes, which assist the body fight illnesses and invading viruses by filtering the substances that flow via lymphatic fluid. Microorganisms and antigens that enter the lymph and tissue fluid are trapped in lymph nodes. The lymphocytes in the lymph nodes are activated by antigens trapped in the lymph nodes.

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## Question 14

**Why is an antibody molecule represented as H<sub>2</sub>L<sub>2</sub>?**

## Solution

Ans: Four polypeptide chains make up an antibody molecule. Two of these chains are referred to as heavy chains, while the other two are referred to as light chains. For B cells, the heavy chain permits antigen-specific binding and subsequent activation. The heavy chain weighs 50 kDa, while the light chain weighs 25 kDa. Antibody light chains are tiny polypeptide units. It contributes to antigen binding and ensures the secretion of effective antibodies.

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## Question 15

**What does the term 'memory' of the Immune system mean?**

## Solution

Ans: It means that every antigen that strikes the body is remembered by the immune system. When the same antigen attacks the body, the immune system detects it right away and generates antibodies to neutralise the antigen's effects. When the antigen hits for the first time, the body produces a low-intensity initial reaction. However, when it strikes a second time, the body responds with a strong secondary reaction, which reduces the amount of foreign antigen.

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## Question 16

**If a patient is advised Anti-Retroviral Therapy, which infection is he suffering from? Name the causative organism.**

## Solution

Ans: If Antiretroviral Therapy is recommended, the person is most likely to develop Acquired ImmunoDeficiency Syndrome (AIDS). The disease is transferred by sexual activity, needle sharing, and tattoo equipment sharing. It does not spread when you touch or sit next to the patient. Human Deficiency Virus is the causal agent (HIV). This virus causes damage to the patient's tissue and cells and is spread through body fluids such as blood and sperm.

## Short Answer Questions

### Question 1

**Differentiate between active immunity and passive immunity.**

## Solution

Ans:

| Active Immunity                                                               | Passive Immunity                                                                                  |
|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| (i) Active immunity develops within the body after a disease has attacked it. | (i) Passive immunity is injected into the body after a pathogen attack.                           |
| (ii) It does not has memory cells                                             | (ii) It has memory cells that can detect and kill the virus more effectively in the second round. |
| (iii) Recollection is possible                                                | (iii) Recollection is not possible                                                                |
| (iv) bacteria attacks are frequently eliminated by active immunity            | (iv) Anti-venom after a snake bite, for example, is passive immunisation                          |

### Question 2

**Differentiate between a benign tumour and a malignant tumour.**

## Solution

Ans:

| Benign Tumour                                         | Malignant Tumour                                   |
|-------------------------------------------------------|----------------------------------------------------|
| (i) It can spread through the body.                   | (i) It grows in a single site and does not spread. |
| (ii) It causes extensive damage to neighboring cells. | (ii) It is the most hazardous type of tumor.       |

## Question 3

**Do you consider passive smoking to be more dangerous than active smoking? Why?**

## Solution

Ans: When we hear the word "smoking," we usually picture someone who is actively smoking a cigarette or something similar. However, we overlook the term "passive smoking." It refers to the quantity of contaminants that enter our bodies through inhalation.

Because the death rate of those who live in an industrial region is substantially higher than that of people who smoke, passive smoking is more harmful. The victims of passive smoking are sometimes unaware of the dangers of the environment in which they live.

## Question 4

**"Prevention is better than cure". Comment.**

## Solution

Ans: "Prevention is better than cure" is an age-old adage that still holds true today.

There are many diseases, such as sexually transmitted diseases and viral disorders, that have yet to be cured. Only by preventing them through various treatments can a healthy person survive from them. Direct exposure to these diseases, which are incurable, can be lethal or severely painful. So, in this remark, it is stated that preventing illness spread is a better option than having a dangerous sickness and attempting to cure it.

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### Question 5

**Explain any three preventive measures to control microbial infections.**

### Solution

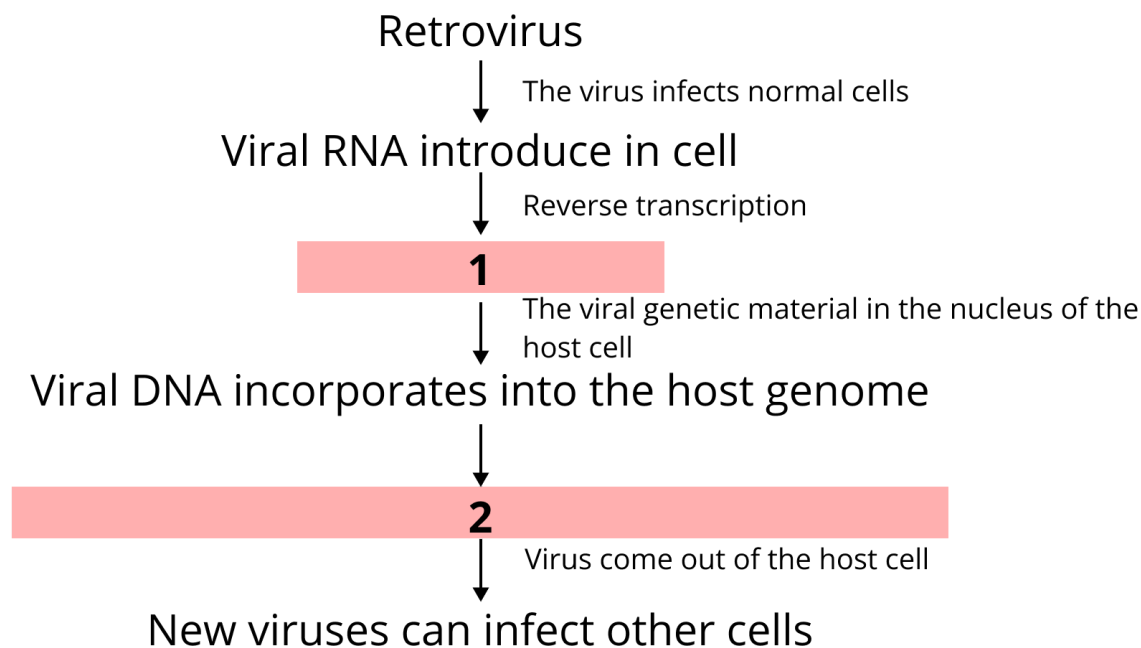
Ans: The measures are:

1. In the human body, or the body of any animal, microbial infection can induce a variety of severe diseases. Bacteria, viruses, fungi, and protozoa are all possibilities. The one thing they all have in common is that they may all be fully eliminated by adopting basic prevention procedures. Personal and public hygiene should be maintained, for example, by keeping one's body clean, wearing clean clothes, and eating fresh food.
2. Cleanliness requirements and procedures should be followed. The public and private restrooms should be cleaned regularly, as should the roadsides, which should be cleansed and treated with antimicrobial liquid.
3. Vaccines (active immunity) and medicines (passive immunity) should be administered with caution and at the appropriate times.

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### Question 6

**In the given flow diagram, the replication of retrovirus in a host is shown. Observe and answer the following questions.**



(a) Fill in (1) and (2)

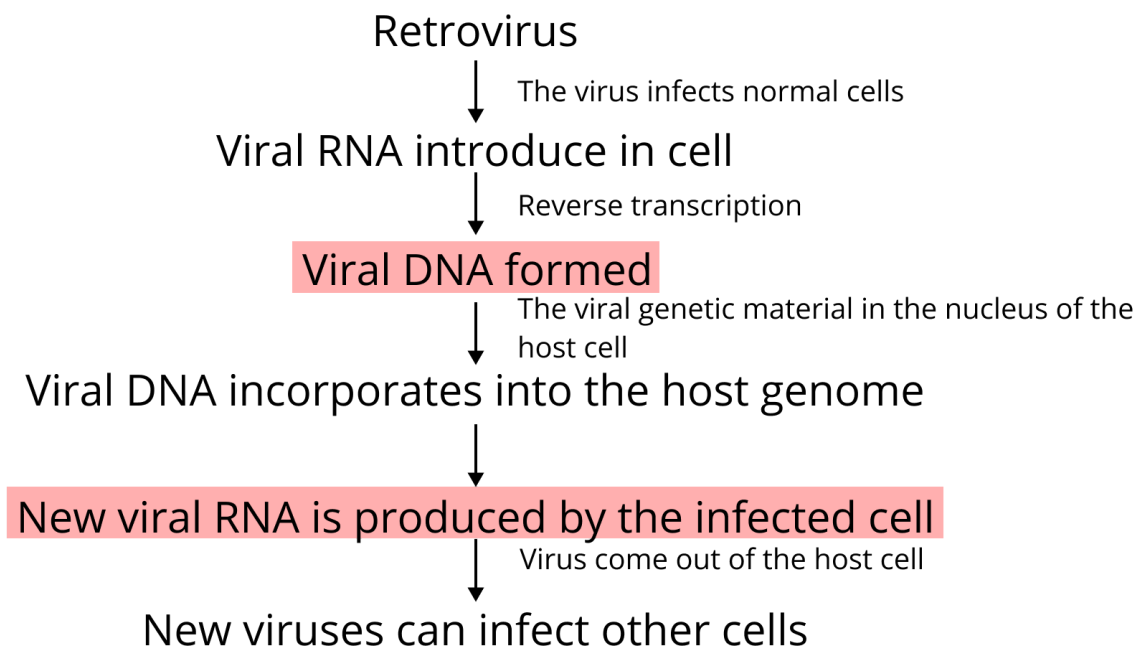
(b) Why is the virus called retrovirus?

(c) Can the infected cell survive while viruses are being replicated and released?

### Solution

Ans: According to the flow diagram, viral DNA is injected into the host body and subsequently transformed to viral DNA using reverse transcriptase. As a result, the number one is: 'viral DNA produced.'

After integrating with the host DNA, the virus replicates its DNA and then releases its genetic material. "New viral RNA is created by the infected cell," says the second.



Ans: Retroviruses are those that employ RNA to store their genetic material before converting it to DNA once inside the host cell. Though HIV does the same thing, it is referred to as a retrovirus.

Ans: Yes, the majority of cells survive and divide normally following infection. Without a robust immune reaction from the host, the virus can replicate and propagate.

### Question 7

**“Maintenance of personal and public hygiene is necessary for prevention and control of many infectious diseases”. Justify the statement giving suitable examples.**

### Solution

Ans: The most significant factor in preventing infectious infections is personal hygiene. A person can avoid a variety of ailments by maintaining it. Personal hygiene entails keeping one's body clean, consuming only pure drinking water and food, and properly disposing of waste and excrement, among other things. When we do not maintain cleanliness, several fungal illnesses and pathogens might interfere with our way of life. Ringworms, eczema, and other skin conditions are among them.

### Question 8

The following table shows certain diseases, their causative organisms and symptoms. Fill in the gaps.

|   | Name of the disease | Causative organism      | Symptoms                                                          |
|---|---------------------|-------------------------|-------------------------------------------------------------------|
| 1 | Ascariasis          | Ascaris                 | _____                                                             |
| 2 | _____               | trichophyton            | The appearance of dry, scaly lesions on various parts of the body |
| 3 | Typhoid             | _____                   | High fever, weakness, headache, Stomach pain, constipation.       |
| 4 | Pneumonia           | Streptococcus pneumonia | _____                                                             |
| 5 | _____               | Rhino Viruses           | Nasal congestion and discharge, sore throat, cough, headache      |
| 6 | Filariasis          | _____                   | Inflammation in lower limbs                                       |

### Solution

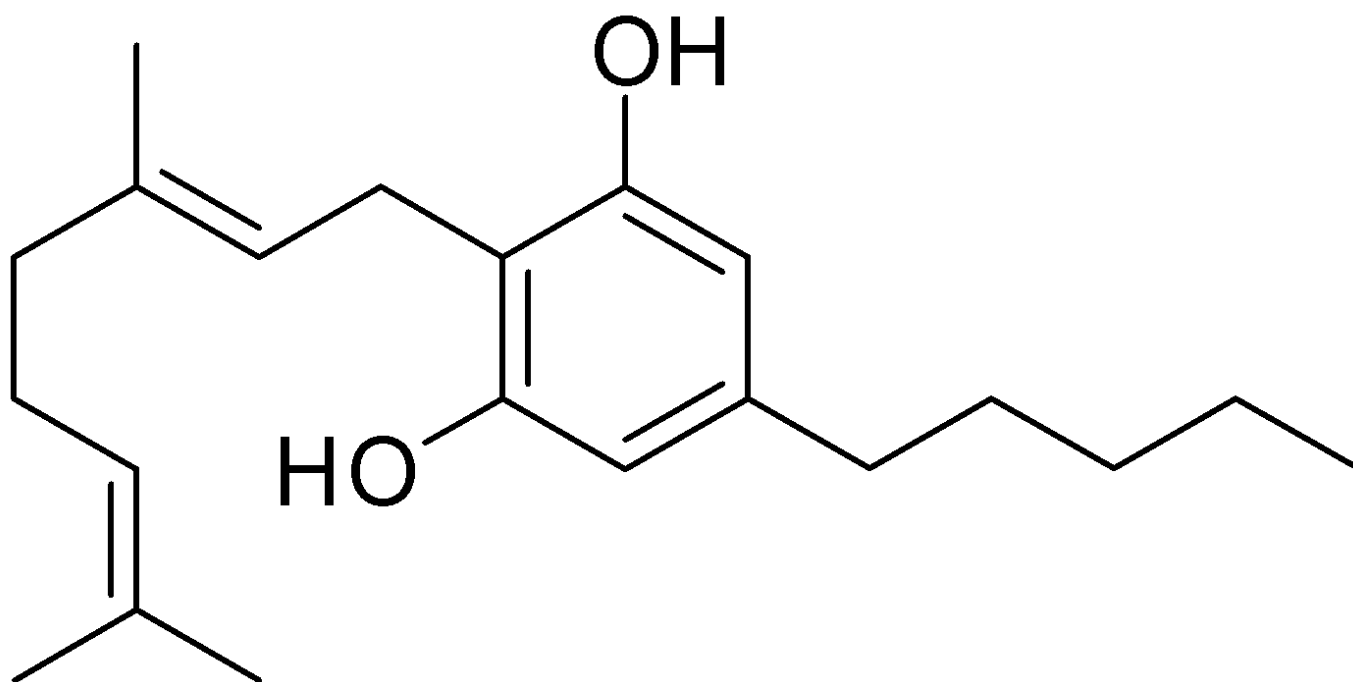
Ans:

|   | Name of the disease | Causative organism | Symptoms                                                                             |
|---|---------------------|--------------------|--------------------------------------------------------------------------------------|
| 1 | Ascariasis          | Ascaris            | Internal bleeding, muscular pain, fever, anaemia and blockage of intestinal passage. |

|   |             |                                        |                                                                                                          |
|---|-------------|----------------------------------------|----------------------------------------------------------------------------------------------------------|
| 2 | ringworms   | trichophyton                           | The appearance of dry, scaly lesions<br>on various parts of the body                                     |
| 3 | Typhoid     | Salmonella typhi                       | High fever, weakness, headache,<br>Stomach pain, constipation.                                           |
| 4 | Pneumonia   | Streptococcus pneumonia                | Fever, chills, cough and headache.<br>The lips and fingernails may turn grey to reddish in severe cases. |
| 5 | Common cold | Rhino Viruses                          | Nasal congestion and discharge,<br>sore throat, cough, headache                                          |
| 6 | Filariasis  | Wuchereria (w.bancrofti and w. malayi) | Inflammation in lower limbs                                                                              |

### Question 9

The outline structure of a drug is given below.



- Which group of drugs does this represent?
- What are the modes of consumption of these drugs?
- Name the organ of the body which is affected by the consumption of these drugs.

### Solution

Ans: The structure of the cannabis molecule is depicted in this diagram.

Natural cannabinoids are derived from the inflorescence of the cannabis sativa plant, and include 'Ganja,' charas, and hashish, to mention a few.

Ans: Inhalation and oral ingestion are the most common methods of administration.

Ans: Cannabinoids bind to cannabinoid receptors, which are mostly found in the brain. These are also well-known for their impact on the body's cardiovascular system.

### Question 10

Give the full form of CT and MRI. How are they different from each other? Where are they used?

## Solution

Ans: Both CT scans and MRIs are used to detect any abnormalities, such as malignant cell development.

These are written in complete form as follows:

CT stands for computer tomography, and MRI stands for magnetic resonance imaging.

CT and MRI are two completely different procedures. CT employs an x-ray to create a three-dimensional image of interior organs and, as a result, detect cancer expansion. A strong magnetic field and non-ionizing radiation are used in MRI to detect any form of alteration (both bacterial and physiological).

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## Question 11

**Many secondary metabolites of plants have medicinal properties. It is their misuse that creates problems. Justify the statement with an example.**

## Solution

Ans: People abusing plant secondary metabolites is not a new occurrence in society. A good example of this is morphine. It is a potent analgesic, which means it relieves pain.

In the medical field, it can be used as an anesthetizer or pain reliever in cases of severe injury.

However, we can witness a great number of people abusing it in our culture.

Codeine is another example. It's a secondary metabolite of the opium plant that's commonly found in cough syrups. However, we may witness many people using it in excess of the amount prescribed by doctors, which is known as drug misuse. Many additional substances, such as amphetamines, LSD, and others, are utilised in the medical field but frequently misused by drug addicts. Drug addiction generates hallucinations or functions as a stimulant for the user's body, but it is ultimately destructive to the person and the environment.

---

## Question 12

**Why are cannabinoids banned in sports and games?**

## Solution

Ans: The biggest issue on the athletic field is a lack of energy in the athletes.

As a result, some athletes abuse a variety of substances in order to boost their energy and stamina, which will ultimately benefit them. Stimulants are the name for these medications.

Cannabinoids are medications that can be used to boost the body's activity. It relieves pain and aids athletes in strengthening their endurance. As a result, the International Olympic Committee has declared it illegal. The world anti-doping agency decides which drugs will be prohibited and which will not.

---

## Question 13

**What is secondary metabolism?**

## Solution

Ans: Metabolites are divided into two categories: primary and secondary. The question of primary and secondary metabolites now emerges.

Primary metabolites are substances that are directly engaged in the growth and development of the human organism. Our bodies cannot function properly without these. Secondary metabolites, on the other hand, are those created by bacteria, fungus, and plants, and we don't require many of them because they aren't involved in regular growth and development. Toxins, chemical compounds, oils, alkaloids, and other substances may be present.

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## Question 14

**Drugs and alcohol give short-term 'high' and long-term 'damages', Discuss.**

## Solution

Ans: Consumption of drugs and alcohol stimulates our bodies, causing the production of feel-good chemicals and possibly elevating our mood. As a result, many people use this to forget about a traumatic event or to live in a state of delusion.

However, long-term use of drugs and alcohol causes major health problems that can lead to death. Alcohol use causes cirrhosis of the liver, which is a fatal illness. Similarly, drug abuse causes a person's mental and physical state to deteriorate rapidly. Even when a person wishes to break these unhealthy behaviours in order to protect his body, he cannot bear the anguish and continues to do so till he dies. As a result, it is recommended that you do not begin using these substances under any circumstances.

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### Question 15

**Diseases like dysentery, cholera, typhoid etc., are more common in overcrowded human settlements. Why?**

### Solution

Ans: In India, overcrowded areas are often unsanitary, making residents prone to diseases. Typhoid, dysentery, and cholera are all separate diseases with one thing in common: they all transmit via the faeco-oral route.

When a person drinks or eats water or food that has been contaminated by the excreta of another infected person, that person becomes infected. So, if an area is packed and no one uses the restroom, and there is a chance that the person's excreta would mingle with the excreta of others in a public water supply, diseases can spread.

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### Question 16

**From which plant cannabinoids are obtained? Name any two cannabinoids. Which part of the body is affected by consuming these substances?**

### Solution

Ans: Cannabinoids are the most important of all the medications. It induces hallucinations and aids in the forgetting of current concerns and the creation of a fantasy world. These come in a variety of forms, including bhang, hashish, charas, and ganja.

These are primarily derived from the cannabis Sativa plant's inflorescence. Other plant parts are also employed to make medications. These medications have an effect on the body's central nervous system (CNS), particularly the brain.

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### Question 17

**In the metropolitan cities of India, many children are suffering from allergy/asthma. What are the main causes of this problem? Give some symptoms of allergic reactions.**

### Solution

Ans: Better lifestyles in metropolitan cities result in less exposure to disease-causing organisms and, as a result, less developed immunity among residents. As a result, human civilization's infrastructure growth and deforestation result in less oxygen being released.

In addition to all of this, industry and the emissions of carbon dioxide from automobiles make the atmosphere extremely hazardous to human survival.

Our lungs are harmed by dust particles and smoke, and the most sensitive demographic, youngsters, suffer from allergies and asthma. Allergic reactions include rashes, watery eyes, and a runny nose, among others.

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### Question 18

**What is the basic principle of vaccination? How do vaccines prevent Microbial infections? Name the organism from which hepatitis B Vaccine is produced.**

### Solution

Ans: The core concepts of vaccination revolve around the immune system's memory. Our bodies have memory cells that remember the structure of diseases once they have infected us. When a second-time assault is performed, the memory is used again. During this stage, the body is well-prepared to combat pathogens. That is why, in the vaccination process, dead or low-potential pathogens are intentionally injected into the body. The body makes antibodies against the infection that has died and will be employed in future attacks. Yeast is used to make the hepatitis B vaccine.

### Question 19

**What is cancer? How is a cancer cell different from a normal cell? How do normal cells attain cancerous nature?**

#### Solution

Ans: Cancer is the uncontrolled development of cells.

Cells of cancer: Cancer divides rapidly and uncontrollably. Even contact inhibition is absent in cells. The length of one's life is undetermined.

Contact inhibition is seen in normal cells. Grow in a well-managed environment. And one's life expectancy is fixed.

Cell growth and development are usually tightly regulated. Normal cells have a feature called contact inhibition, which prevents them from growing uncontrollably because of the surrounding cells. Normal cells lose this characteristic and transform into malignant cells, which multiply rapidly and create a tumour. Carcinogens produce this conversion, which might be caused by physical, chemical, or biological reasons. For instance, x-rays, UV radiation, oncoviruses, and so on.

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### Question 20

**A person shows strong unusual hypersensitive reactions when exposed to certain substances present in the air. Identify the condition. Name the cells responsible for such reactions. What precautions should be taken to avoid such reactions?**

#### Solution

Ans: Allergy is a condition in which a person has a hypersensitive reaction when exposed to a certain material.

Allergies are caused by white blood cells such as mast cells and basophils. Mast cells release substances such as histamine and serotonin, which cause an allergic reaction when they come into contact with this material. A person with an allergy is aware of the chemicals he or she is allergic to, and should avoid those things to avoid developing an allergy.

For example, if a person has a pollen grain allergy, he or she should avoid coming close to the bloom to avoid direct pollen grain contact.

### Question 21

**For an organ transplant, it is an advantage to have an identical twin. Why?**

#### Solution

Ans: Allergy is a condition in which a person's immune system reacts abnormally when they are exposed to a certain substance.

White blood cells such as mast cells and basophils induce allergies. When mast cells come into touch with this material, they release chemicals like histamine and serotonin, which trigger an allergic reaction. A person who has an allergy is aware of the chemicals to which he or she is allergic and should avoid those substances in order to avoid acquiring an allergy.

If a person has a pollen grain allergy, for example, he or she should stay away from the bloom to avoid direct pollen grain contact.

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### Question 22

**What are lifestyle diseases? How are they caused? Name any two such diseases.**

#### Solution

Ans: Lifestyle diseases are non-communicable diseases caused by a lack of physical exercise, poor eating habits, cigarette use (which causes heart disease), alcohol, obesity, and other factors.

These illnesses are linked to how we conduct our lives. Many diseases are caused by a lack of physical activity and bad dietary habits. Heart disease, stroke, and other disorders are caused by smoking tobacco and consuming other disease-causing substances. Obesity is a major concern nowadays, and people are becoming more conscious of it.

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### Question 23

**If there are two pathogenic viruses, one with DNA and the other with RNA, which would mutate faster? And why?**

## Solution

Ans: If two pathogenic viruses exist, one with DNA and the other with RNA, the pathogenic virus with RNA will mutate more quickly. Actually, RNA replication is more error-prone than DNA replication, which is why RNA has a higher mutation rate than DNA. DNA is slightly more stable than RNA and is less susceptible to chemical changes. RNA, on the other hand, is less stable than DNA and is more vulnerable to mutation.

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## Long Answer Questions

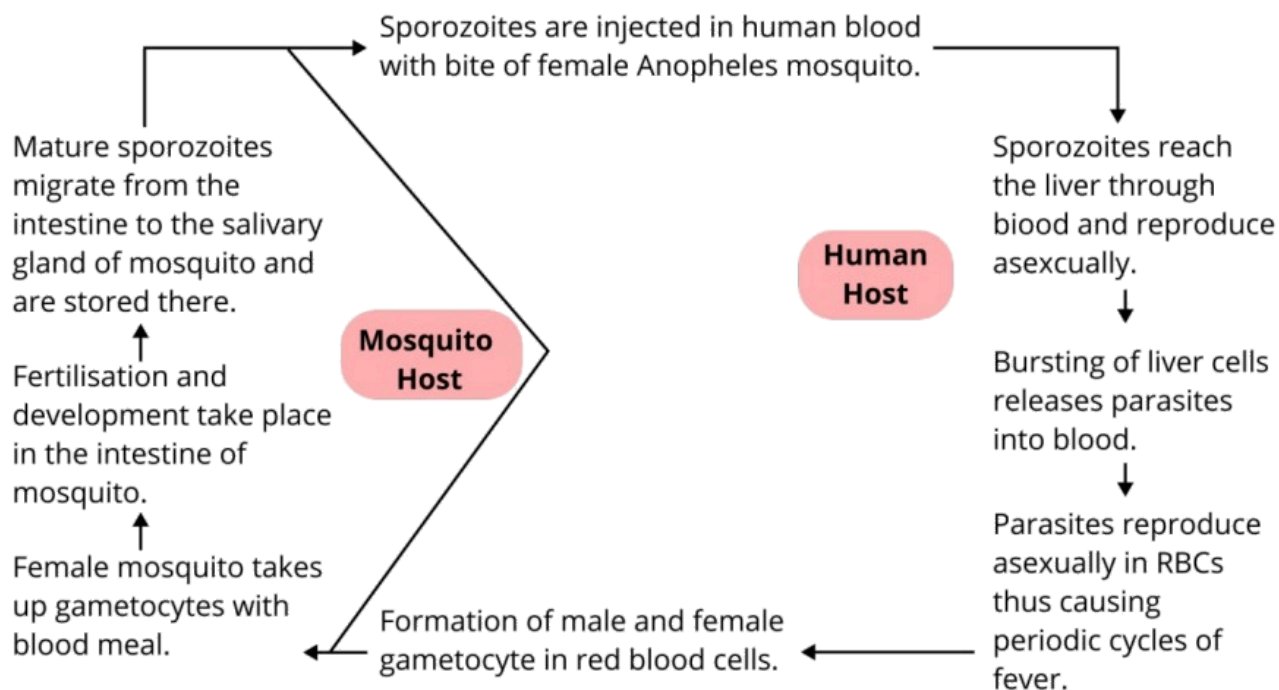
### Question 1

**Represent schematically the life cycle of a malarial parasite.**

### Solution

Ans: Malaria is a mosquito-borne disease spread by the female mosquito *Anopheles gambiae*.

Headache, Nausea, and Vomiting, Fever, Chills, and Sweating, Spleen Enlargement, Muscular Fatigue, and Pain are all symptoms of Malaria. The following is a schematic illustration of the malaria life cycle: -



1. Sporozoite, a motile infective form, is transmitted by the female *Anopheles* mosquito to a vertebrate host, such as humans.
  2. The sporozoites infiltrate the liver and grow into schizonts (asexual schizonts).
  3. These schizonts are broken up and released by the Merozoites.
  4. Merozoites have entered the RBC and are asexually reproducing and infecting an RBC, causing fever cycles.
  5. The trophozoite evolves into schizonts, which create merozoites or parasites, at the ring stage.
  6. Gametophytes are parasites that evolve into gametophytes.
  7. The gametophytes generated when a female *Anopheles* mosquito bites an infected person are eaten.
- The parasites then multiply in the mosquito's gut, which is referred to as the sporogonic cycle.
9. These microgametes create zygotes when they enter macrogametes.
  10. Sporozoites are zygotes that have become motile and elongated.

**Question 2**

**Compare the lifestyle of people living in the urban areas with those of rural areas and briefly describe how the lifestyle affects their health.**

**Solution**

Ans: The following factors contribute to poor health conditions in communities due to a lack of sufficient hygiene, sanitation, and basic health services.

| S.N<br>o. | Rural Areas                                                                   | Urban Areas                                                                 |
|-----------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1         | Poor living conditions                                                        | Better living conditions                                                    |
| 2         | Lack of healthcare facilities                                                 | Healthcare facilities are present                                           |
| 3         | Unavailability of necessities like electricity, quality education, water etc. | Availability of necessities like electricity, quality education, water etc. |
| 4         | Most of the people do jobs while sitting for long hours.                      | Most of the jobs involve manual labour.                                     |
| 5         | Low level of environmental pollution.                                         | High level of environmental pollution.                                      |
| 6         | Poor hygienic condition                                                       | Good hygienic condition                                                     |
| 7         | Can get quality medical facilities.                                           | May not get quality medical facilities.                                     |
| 8         | The incidence of diabetes and cardiovascular disease is very high.            | The incidence of diabetes and cardiovascular disease is low.                |

**Question 3**

**Why do some adolescents start taking drugs? How can this be avoided?**

## Solution

Ans: Drugs are chemical molecules that have psychological and physiological effects on your body. Cocaine, morphine, heroin, LSD, and other drugs are illegal.

Some youngsters start to dabble in drugs:

1. Peer pressure: A person may be pressured by peers to use drugs, and as a result, the individual begins to use drugs in order to gain acceptability in the social group.
2. Feelings of Happiness: People use drugs to make themselves feel better or to experience euphoria.

Medicines interacting with neurological receptors in the brain generate this experience.

3. Experimentation: Some people experiment with drugs in order to feel the rush and excitement that comes with it.
4. Depression: Some people take antidepressants to help them feel better. Drugs make people happy and at ease.

These can be avoided if the person talks to friends, relatives, or seeks professional help to deal with the stress:

Refuse to take drugs from anyone who tries to push them on you.

Peer pressure should not be allowed to influence a person's decision.

Maintain your health by eating correctly and participating in a variety of physical activities.

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## Question 4

**In your locality, if a person is addicted to alcohol, what kind of behavioural changes do you observe in that person? Suggest measures to overcome the problem.**

## Solution

Ans: When a person is addicted to alcohol, some behavioural changes occur, such as:

1. If a person is addicted to alcohol, he or she develops a selfish attitude and may deny his or her family of essentials in order to meet their own needs.
2. Recovering from the affects of alcohol takes a long time.

3. Focusing less on personal and professional issues.
4. Withdrawal symptoms arise when alcohol usage is stopped.
5. Repeated failures to abstain from consuming alcohol.
6. Seek professional help if you need it to beat alcoholism.
7. Talk to your family and friends about the issue.
8. Establish a drinking limit that is lower than the recommended levels.
9. Make an effort to stay active in both your personal and professional life.
10. Watch out for peer pressure. Don't be swayed by peer pressure.

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### Question 5

**What are the methods of cancer detection? Describe the common approaches for the treatment of cancer.**

### Solution

Ans: The approaches for detecting cancer are as follows:

1. Biopsy: A small piece of questionable tissue is taken and histopathologically analysed in this technique. This aids in the discovery of any cell abnormalities.
2. Blood and bone marrow tests: These tests demonstrate an increase in the number of cells in the body. This aids in the diagnosis of the condition by the doctor.
3. Imaging Techniques: X-rays, CT scans, and MRIs are used to diagnose cancer of the internal organs.
4. Ultrasound: This test uses sound waves to create images of interior organs and detect any abnormalities.
5. In addition to the techniques listed above, antibodies against cancer-specific antigens and molecular biotechnology are used in some cases.

Surgery, radiation, and immunotherapy are all common treatment options:

- a. Surgery: This entails removing the tumour surgically.

- b. Radiotherapy: Cancerous cells are killed by radioactive rays. It's crucial to avoid killing healthy cells.
- c. Immunotherapy: This entails using alpha-interferon to allow chemotherapeutic drugs to kill cancer cells that are resistant to them.

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### Question 6

**Drugs like LSD, barbiturates, amphetamines, etc., are used as medicines to help patients with mental illness. However, excessive doses and abusive usage are harmful. Enumerate the major adverse effects of such drugs in humans.**

### Solution

Ans: Drugs are chemical molecules that affect your body's physiological and psychological functions; nonetheless, an overdose can cause the following adverse effects:

1. In overdose circumstances, anxiety and shakiness are prevalent.
2. Vomiting and nausea are common side effects.
3. In both professional and personal life, there is a lack of interest.
4. There are challenges with adjusting to social situations.
5. Withdrawal symptoms are visible.
6. Irresponsible behaviour, aggression, and vandalism are all examples of irresponsible behaviour.
7. There are signs of exhaustion, aggression, and restlessness.
8. There is a general lack of interest.

Dealing with the issue:

1. The individual attempts to cope with the stress by talking to friends, family, or seeking professional assistance.
2. When someone tries to force you to take drugs, politely decline.
3. One should not succumb to peer pressure.
4. Maintain a healthy lifestyle by eating well and getting plenty of exercise.

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### Question 7

**What is the Pulse Polio Programme of the Government of India? What is OPV? Why is it that India is yet to eradicate Polio?**

### Solution

Ans: 1. These vaccines are third-generation vaccines.

2. Plasmids, which are little circular bits of DNA, are used to construct them.

3. Pathogen-specific proteins have been genetically engineered into these plasmids.

4. The DNA is read by the body when they are injected into the body, and the host cell begins to synthesise pathogen proteins.

5. These proteins are thought to be alien substances. The immune system has been triggered.

6. The body now recognises the virus and initiates a response whenever it enters.

Examples:

1. Human vaccine against the bird flu virus

2. Human vaccine against the Nile virus

Benefits: -

Infections are unlikely, and they elicit both cell-mediated and humoral immune responses.

3. Initiate an immune reaction that will last for a long time.

4. When a true poliovirus infects the body, the body remembers how it reacted and fights back.

5. A single OPV dose gives long-term protection against all three poliovirus strains.

Despite the government's efforts, India has not been able to eradicate polio, and some cases are still being reported. This could be due to a lack of information, understanding, or accessibility in specific locations.

### Question 8

**What are recombinant DNA vaccines? Give two examples of such vaccines. Discuss their advantages.**

### Solution

Ans: 1. These vaccines are third-generation vaccines.

2. Plasmids, which are little circular bits of DNA, are used to construct them.

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4. The DNA is read by the body when they are injected into the body, and the host cell begins to synthesise pathogen proteins.

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