8. Human Health and Diseases

Question 1. What are the various public health measures, which you would suggest as safeguard against infectious diseases?

Answer: Public health measures are preventive measures which are taken to check the spread of various infectious diseases. These measures should be taken to reduce the contact with infectious agents.
Some of these methods are:
(1) Maintenance of personal and public hygiene: It is one of the most important methods of preventing infectious diseases. This measure includes maintaining a clean body, consumption of healthy and nutritious food, drinking clean water, etc. Public hygienic includes proper disposal of waste material, excreta, periodic cleaning, and disinfection of water reservoirs.

(2) Isolation: To prevent the spread of air-borne diseases such as pneumonia, chicken pox, tuberculosis, etc., it is essential to keep the infected person in isolation to reduce the chances of spreading these diseases.

(3) Vaccination: Vaccination is the protection of the body from communicable diseases by administering some agent that mimics the microbe inside the body. It helps in providing passive immunization to the body. Several vaccines are available against many diseases such as tetanus, polio, measles, mumps, etc.

(4) Vector Eradication: Various diseases such as malaria, filariasis, dengue, and chikungunya spread through vectors. Thus, these diseases can be prevented by providing a clean environment and by preventing the breeding of mosquitoes. This can be achieved by not allowing water to stagnate around residential areas. Also, measures like regular cleaning of coolers, use of mosquito nets and insecticides such as malathion in drains, ponds, etc. can be undertaken to ensure a healthy environment. Introducing Laxvivorous fish such as Gambusia in ponds also controls the breeding of mosquito larvae in stagnant water.

Question 2. In which way has the study of biology helped us to control infectious diseases?

Answer: Biological research and tools has helped a lot to control and eradicate communicable diseases. It helps us in various ways, some of them are:

(a) To know the nature of disease.
(b) To find out the mode of transmission of disease.
(c) To provide treatment and cure the infected person by medicines.
(d) Provide vaccines and immunization treatment for preventing the further spread of disease.

Question 3. How does the transmission of each of the following diseases take place?

(a) Amoebiasis (b) Malaria (c) Ascariasis (d) Pneumonia

Answer:

Disease	Mode of transmission
(a) Amoebiasis	Direct and oral. The tetranucleate cysts are ingested with contaminated food and water.
(b) Malaria	Indirect and inoculative. The sporozoites are introduced along with the saliva of vector female Anopheles mosquitoes.
(c) Ascariasis	Direct and oral. Capsules with second juveniles are ingested with contaminated food and water.
(d) Pneumonia	Air borne or through droplet infection or aerosols or contaminated utensils. Bacterial cysts are spread by sputum of the patients.

Question 4. What measure would you take to prevent water-borne diseases?

Answer: Drinking contaminated water is one of the main reason for water born diseases such as typhoid, cholera etc. The measures that can be taken to prevent water-borne diseases are as follows
1. To prevent these diseases we should dispose of sewage, excreta etc. properly.
2. We should check our water reservoirs regularly.
3. We should consume clean, pure, contamination free water only.

Question 5. Discuss with your teacher what does 'a suitable gene' mean, in the context of DNA vaccines.

Answer: Suitable gene refers to a specific segment of DNA, which is given to a person in the form of vaccine. This segment of DNA produces a specific protein, which kills the disease causing pathogen in the body, hence, providing immunity to the person.

Question 6. Name the primary and secondary lymphoid organs.

Answer: The primary lymphoid organs are bone marrow and thymus where immature lymphocytes differentiate into antigen sensitive lymphocytes.
Bone marrow : Bone marrow is the main lymphoid organ where all blood cells including lymphocytes are formed. Maturation of B-lymphocyte occurs here.

Thymus : Thymus is the site for T-lymphocytes maturation. Thymus is situated near the heart.

The secondary lymphoid organs are spleen, lymph nodes, tonsils,Payer's patches of small intestine and appendix.

Spleen : It is a bean-shaped organ which is the largest single mass of lymphoid tissue in the body. In foetus the spleen produces all type of blood cells but in adult it only produces lymphocytes.

Lymph nodes : These are small solid structures found at intervals along the lymphatic system. They are composed of lymphoid tissue and act as filters for the lymph. Lymph nodes also produce lymphocytes and plasma cells.

Tonsils : Usually there are only 6 tonsils. They act as filters to protect the body from bacteria and aid in the formation of white blood cells.

Peter's patches : They are clusters of lymph nodules found in small intestine along the ileum. They produce lymphocytes.

Mucosal-Associated Lymphoid Tissue (MALT) : MALT are significant aggregation of lymphoid tissues which are seen in relation to the mucosa of the major tracts like respiratory, alimentary canal and urinogenital tracts. It constitute about 50% of the lymphoid tissue in human body. They don't serve as filters of lymph. They are centres of lymphocytes production. Phagocytic macrophages and dendritic cells are also present.

Question 7. The following are some well-known abbreviations, which have been used in this chapter. Expand each one to its full form:

(a) MALT (b) CMI (c) AIDS (d) NACO (e) HIV

Answer:

Abbreviation	Expanded form
(a) MALT	Mucosal-Associated Lymphoid Tissue.
(b) CMI	Cell-Mediated Immunity.
(c) AIDS	Acquired Immuno-Deficiency Syndrome.
(d) NACO	"National AIDS Control Organization.
(e) HIV	Human Immuno-deficiency Virus.

Question 8. Differentiate the following and give examples of each:

(a) Innate and acquired immunity (b) Active and passive immunity

Answer: **(a)** Innate and acquired immunity

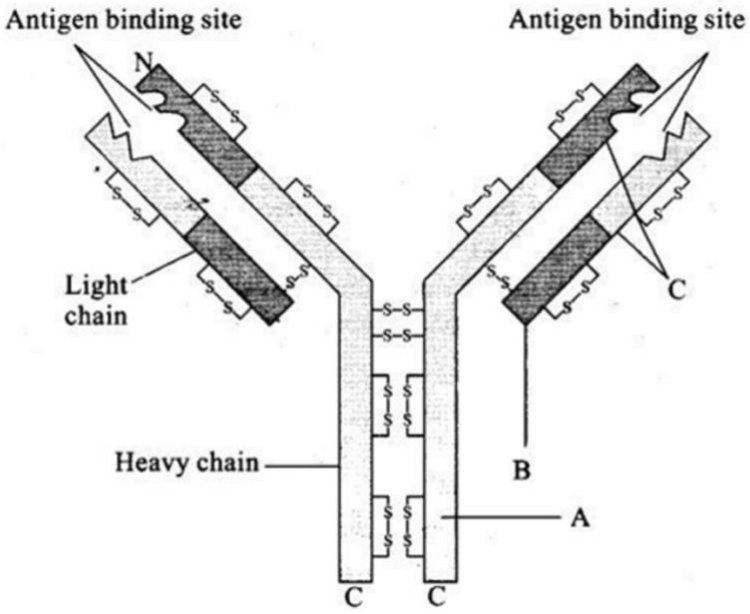
Innate immunity	Acquired immunity
It is a non−pathogen specific type of defense mechanism.	It is a pathogen specific type of defense mechanism.
It is inherited from parents and protects the individual since birth.	It is acquired after the birth of an individual.
It operates by providing barriers against the entry of foreign infectious agents.	It operates by producing primary and secondary responses, which are mediated by B−lymphocytes and T-lymphocytes.
It does not have a specific memory.	It is characterized by an immunological memory.

(b) Active and passive immunity

Active immunity	**Passive immunity**
It is a type of acquired immunity in which the body produces its own antibodies against disease-causing antigens.	It is a type of acquired immunity in which readymade antibodies are transferred from one individual to another.
It has a long lasting effect.	It does not have long lasting effect.
It is slow. It takes time in producing antibodies and giving responses.	It is fast. It provides immediate relief.
Injecting microbes through vaccination inside the body is an example of active immunity.	Transfer of antibodies present in the mother's milk to the infant is an example of passive immunity.

Question 9. Draw a well-labelled diagram of an antibody molecule.

Answer: The diagram of an antibody molecule is:



Question 10. What are the various routes by which transmission of human immunodeficiency virus takes place?

Answer: AIDS (Acquired Immuno-Deficiency Syndrome) is caused by the Human immunodeficiency virus (HIV).
It has the following modes of transmission:
Unprotected sexual contact with an infected person.
Transfusion of blood from a healthy to an infected person.
Sharing infected needles and syringes.
From an infected mother to a child through the placenta.

Question 11. What is the mechanism by which the AIDS virus causes deficiency of immune system of the infected person?

Answer: In infected person, HIV enters into macrophages where virus is replicated and gets incorporated with host cell's DNA with the help of enzyme RNA transcriptase. Infected host cells produce virus particles so that host's macrophages act as HIV factors. At the same time, HIV enters into helper T-lymphocytes and replicates to form progeny virus. They again attack blood and helper T-lymphocytes . This disease in T-helper leads to deficient immunity in infected persons.

Question 12. How is a cancerous cell different from a normal cell?

Answer: An abnormal and uncontrolled division of cells is termed as cancer.

Cancer Cell	Normal Cell
(i) Cancer cells divide in an uncontrolled manner.	(i) Normal cells divide in a controlled manner.
(ii) The cells do not show contact inhibition.	(ii) These cells show contact inhibition.
(iii) Lifespan is indefinite.	(iii) There is a definite lifespan.

The growth and differentiation of cells is highly controlled and regulated. The normal cells show a property called contact inhibition. The surrounding cell inhibits uncontrolled growth and division of

cells. The normal cells lose this property and become cancerous cell giving rise to masses of cells called tumors. Transformation of normal cells into cancerous cells is induced by physical, chemical and biological agents that are called carcinogens.

Question 13. Explain what is meant by metastasis.

Answer: Metastasis is ability of cancer cells to spread from one organ or part of the body to another. Cancer cells migrate through blood or lymph pathway and invade other tissues and form new tumors. The process is termed as metastasis. It is the property of malignant tumor.

Question 14. List the harmful effects caused by alcohol/drug abuse.

Answer: Harmful effects caused by alcohol/drug abuse
1. These reduce the efficiency of all the tissues of our body. Long-time use of drugs and alcohol can cause many mental and physical diseases.

2. These dilate the blood vessels and affect the normal functioning of the heart.

3. Excessive drug/alcohol abuse can lead to cirrhosis in the liver.

4. Excessive drug/alcohol abuse may increase the workload of kidneys and causes kidney failure.

5. Long-time use of alcohols /drugs can cause impotence.

6. Alcoholics lose their image in society because of their nature created under the influence of alcohols.

7. Drug/alcohol abuse increases family violence which affects their family and social life.

Question 15. Do you think that friends can influence one to take alcohol/drugs? If yes, how may one protect himself/herself from such an influence?

Answer: Yes, friends can influence one to take drugs. Following measures can be taken:

(i) Avoiding undue peer pressure.
(ii) Not taking undue pressure of failures beyond its threshold. (iii) Getting counselling from some counsellor
(iv) Seeking help from parents and peers

(v) Seeking medical help

Question 16. Why is that once a person starts taking alcohol or drugs, it is difficult to get rid of this habit? Discuss it with your teacher.

Answer: Once a person starts taking alcohol or drugs, he becomes addict to these substances physically and mentally. Whenever, he tries to ged rid of his habit, he shows unpleasant withdrawal symptoms and these include vomiting, diarrhoea, shivering, twitching, perspiration, abdominal and muscular cramps, etc.
So, it becomes difficult for a person to get rid of this habit.

Question 17. In your view what motivates youngsters to take to alcohol or drugs and how can this be avoided?

Answer: Youngsters generally take alcohol or drugs on the basis of following factors :
a) Curiosity
b) Pleasure
c) To escape from the realities of life, to overcome frustration and depression.
d) Friends pressure
e) Desire of excitement
f) Desire to do more work
g) Unhappy married life

Monotony of daily life It can be avoided by the following ways :
a) Educating and counselling the child to face problems and stresses and accept disappointments and failure as a part of life.
b) A child should not be pushed unduly to perform beyond his capacity.
c) Parents and teachers should be alert about the activities to the child.
d) Help can be taken from highly qualified psychologists and psychiatrists.