

Very Short Answer Questions

[1 Mark]

Q.1. Malaria, typhoid, pneumonia and amoebiasis are some of the human infectious diseases. Which ones of these are transmitted through mechanical carriers?

Ans. Malaria and amoebiasis are transmitted through mechanical carriers.

Q.2. Name the two intermediate hosts which the human liver fluke depends on to complete its life cycle so as to facilitate parasitization of its primary host.

Ans. Snail and Fish.

Q.3. Why is *Gambusia* introduced into drains and ponds?

Ans. To feed on mosquito larvae so as to eliminate the vectors responsible for causing malaria.

Q.4. How does haemozoin affect the human body when released in blood during malarial infection?

Ans. Haemozoin is responsible for the chill and high fever recurring every three to four days during malarial infection

Q.5. State two different roles of spleen in the human body.

Ans. Spleen is the secondary lymphoid organ that stores lymphocytes, it filters microbes and acts as a reservoir to store erythrocytes (*Any two*).

Q.6. A boy of ten years had chicken pox. He is not expected to have the same disease for the rest of his life. Mention how it is possible.

Ans. The boy when encounters a pathogen for the first time, his body produces antibodies that results in the memory of the first encounter, to protect the body in future.

Q.7. Why do pollen grains of some flowers trigger 'sneezing' in some people?

Ans. Pollen grains trigger sneezing by causing allergic reaction.

Q.8. Why is secondary immune response more intense than the primary immune response in humans?

Ans. This is because of presence of antibodies developed during primary.

Q.9. Name any two types of cells which act as 'Cellular Barriers' to provide Innate Immunity in humans.

Ans. Polymorphonuclear Leukocytes/Neutrophils/Monocyte, Natural Killer (type of lymphocyte), macrophages. (*Any two*)

Q.10. How do interferons protect us?

Ans. Interferons protect non-infected cells from further viral infections, by creating cytokine barriers.

Q.11. When does a human body elicit an anamnestic response?

Ans. At the time of secondary response.

Q.12. Some allergens trigger sneezing and wheezing in human beings. What causes this type of response by the body?

Ans. The exaggerated response of the immune systems to certain antigens (allergens) present in the environment is the cause of this type of response.

Q.13. State the functions of mast cells in allergy response.

Ans. Mast cells release chemicals like histamine and serotonin in allergic response

Q.14. What is an autoimmune disease? Give an example.

Ans. It is an abnormal immune response in which the immune system of the body starts rejecting its own body cells or 'self' cells and molecules. For example, rheumatoid arthritis.

Q.15. What type of virus causes AIDS? Name its genetic material.

Ans. Retrovirus causes AIDS. RNA is its genetic material.

Q.16. Name the type of cells the AIDS virus enters into after getting in the human body.

Ans. Monocytes and helper T-lymphocytes.

Q.17. Name two STDs which can be transmitted through contaminated blood.

Ans. Hepatitis-B and AIDS are the two STDs which can be transmitted through contaminated blood.

Q.18. What is it that prevents a child to suffer from a disease he/she is vaccinated against? Give one reason.

Ans. The immunological memory induced by the vaccine in a child prevents the recurrence of a disease.

Q.19. How does colostrum provide initial protection against diseases to new born infants? Give one reason.

Ans. Colostrum contains several antibodies which are absolutely essential for developing resistance in the new-born babies.

Q.20. Name the category of the disease Rheumatoid arthritis.

Ans. Auto-immune disease.

Q.21. Mention the useful as well as the harmful drug obtained from the latex of Poppy plant.

Ans. Useful drug—morphine, Harmful drug—heroin.

Q.22. Why sharing of injection needles between two individuals is not recommended?

Ans. Sharing of needles can transmit diseases like HIV, AIDS, Hepatitis B or C from infected to noninfected individuals.

Q.23. Retroviruses have no DNA. However, the DNA of the infected host cell does possess viral DNA. How is it possible?

Ans. On infecting the host cell, the viral RNA transforms into viral DNA by reverse transcription. This viral DNA then incorporates into the host DNA.

Very Short Answer Questions (OIQ)

[1 Mark]

Q.1. Recently chikungunya cases were reported from various parts of the country. Name the vector responsible.

Ans. *Aedes* mosquito is responsible for chikungunya cases.

Q.2. What causes swelling of the lower limbs in patients suffering from filariasis?

Ans. *Wuchereria* (*W. bancrofti* and *W. malayi*).

Q.3. Name the causative organism of influenza.

Ans. *Myxovirus influenzae*.

Q.4. Give scientific name of two helminthes that are pathogenic to man.

Ans. *Wuchereria bancrofti*, *Ascaris lumbricoides*

Q.5. Name the respiratory disease that infects lungs and one that do not infect lungs.

Ans. Pneumonia infects lungs; common cold do not infect lungs.

Q.6. Name the two major groups of cells required in attaining specific immunity

Ans. B-cells and T-cells.

Q.7. What are primary lymphoid organs?

Ans. The primary lymphoid organs are those organs in which B-lymphocytes and T-lymphocytes undergo maturation. For example, bone marrow and thymus.

Q.8. What happens in lymphoid organ with respect to immunity?

Ans. In the lymphoid organ, maturation and proliferation of lymphocytes take place.

Q.9. What role do macrophages play in providing immunity to humans?

Ans. Macrophages destroy the microbes (by phagocytosis) and provide protection against diseases.

Q.10. How do neutrophils act as a cellular barrier to pathogens in humans?

Ans. Neutrophils in blood can phagocytose and destroy the microbes.

Q.11. Given below are some human organs. Identify one primary and one secondary lymphoid organ: Liver, Thymus, Stomach, Thyroid, Tonsils.

Ans. Primary lymphoid organ is thymus. Secondary lymphoid organ is tonsils.

Q.12. Name the types of cells that produce antibodies.

Ans. B-cells produce antibodies.

Q.13. Which category of adaptive immunity is provided by vaccination?

Ans. Active immunity

Q.14. What are interferons?

Ans. Virus infected cells secrete proteins called interferons which protect non-infected cells from further viral infection.

Q.15. "Pranay suffered from measles at the age of 10 years. There are rare chances of his getting infected with the same disease for the rest of his life." Give reason for the statement.

Ans. First exposure to the infection works as vaccination, the immune system of the body gets familiar with the nature of microorganisms and specific antibodies can be produced against infection.

Q.16. Thymus of a new born child was degenerating right from birth due to a genetic disorder. Predict its two impacts on the health of the child.

Ans. Thymus provides micro-environment for the development and maturation of T-lymphocytes. Its degeneration will weaken the immune system so the child will be prone to frequent infections.

Q.17. In what way are monocytes a cellular barrier in immunity?

Ans. Monocytes can phagocytose (by the process called phagocytosis) and thereby destroy the pathogens.

Q.18. What is humoral immunity?

Ans. It refers to immunity manifested by the antibodies circulating in the body fluids.

Q.19. Write the main function of immune system.

Ans. Immune system protects our body from various infectious agents and cancer.

Q.20. Give any one example where passive immunisation is needed.

Ans. Passive immunisation is required during the initial days of lactation by the new born infant. The colostrum secreted by mother has abundant antibodies to protect the infant.

Q.21. Each immunoglobulin has two heavy chains and two light chains, where is the antigen binding site present?

Ans. The antigen binding site is present in variable region of both heavy and light chains.

Q.22. Expand GALT.

Ans. Gut associated lymphoid tissue.

Q.23. Name two curable sexually transmitted diseases.

Ans. Gonorrhoea and syphilis.

Q.24. Name two such organisms which AIDS patient become infected with.

Ans. *Mycobacterium* and *Toxoplasma*.

Q.25. What is neoplasm?

Ans. The uncontrolled proliferation of cells results in clones called neoplasm or tumour.

Q.26. Name the cellular genes which when activated can cause cancer.

Ans. Cellular oncogenes or proto-oncogenes.

Q.27. What do cellular oncogenes code for in normal cells?

Ans. Cellular oncogenes code for certain particular growth factors.

Q.28. When is a tumour referred to as malignant?

Ans. When a tumour spreads to different sites through body fluids, it is said to be malignant.

Q.29. What is biopsy?

Ans. It is removal of tissue or other material from the body for microscopic examination to confirm a diagnosis.

Q.30. Name three opioids.

Ans. Morphine, cocaine and heroin.

Q.31. Write two examples of carcinogens.

Ans. Ultraviolet rays and X-rays.

Q.32. In what different forms is the tobacco used? Name its addicting component.

Ans. Tobacco is smoked, chewed or snuffed. Its addicting component is nicotine.

Q.33. What is the source of cocaine?

Ans. Leaves and young shoots of the South American coca plant *Erythroxylum coca*.

Q.34. What is meant by withdrawal symptoms?

Ans. It is the state experienced by addicts when their regular dose of alcohol/drug is abruptly discontinued. It is often characterised by anxiety, trembling, nausea and sweating.

Q.35. Expand LSD. Name its source organism. What category of drug is it?

Ans. LSD—Lysergic acid diethyl amide obtained from Ergot fungus. It is a hallucinogen and causes temporary well being.

Q.36. What is incubation period? How long it is for AIDS virus?

Ans. The time period between infection and appearance of symptoms is called incubation period. Incubation period in AIDS may vary from a few months to many year.

Q.37. Which organ can trap the microbes in the body fluid?

Ans. Lymph.

Q.38. High fever, loss of appetite, stomach pain and constipation are some of the symptoms seen in a patient. How would the doctor confirm that the patient is suffering from typhoid and not amoebiasis?

Ans. By performing Widal test.

Q.39. Millions of chickens were killed in West Bengal, Orissa and Maharashtra recently. What was the reason?

Ans. Millions of chickens were killed (culled) in West Bengal, Orissa and Maharashtra because they were found to be infected with H5N1 virus, the causal organism of Bird Flu.

Q.40. How does saliva act in body defence?

Ans. Saliva is chemically composed of lysozyme which digests the bacterial cell wall and kills them.

Q.41. How does CO₂ interfere with O₂ transport in the blood?

Ans. CO₂ combines with haemoglobin more quickly and firmly than O₂.

Q.42. Why does an AIDS patient suffer from many other infections?

Ans. Due to reduction in number of helper T-cells, immune system of person become weak.

Short Answer Questions-I (PYQ)

[2 Marks]

Q.1. Define the term 'health'. Mention any two ways of maintaining it.

Ans. Health is a state of complete physical, mental and social well-being.
Good health is maintained by balanced diet/personal hygiene/regular exercise.

Q.2. List the symptoms of Ascariasis. How does a healthy person acquire this infection?

Ans. Symptoms of Ascariasis: Internal bleeding, muscular pain, anaemia, blockage of intestinal passage.

A healthy person can acquire this infection by intake of water, vegetables/fruits/foods contaminated with eggs of the parasite.

Q.3. Name the causative organism of the disease amoebiasis. List three symptoms of the disease.

Ans. *Entamoeba histolytica* causes amoebiasis.

Symptoms are: constipation, abdominal pain, cramps, stool with excess mucous/blood clots.

Q.4. Write the scientific names of the causal organisms of elephantiasis and ringworm in humans. Mention the body parts affected by them.

Ans.

Disease	Causal Organism	Body parts affected
Elephantiasis	<i>Wuchereria bancrofti</i> and <i>Wuchereria malayi</i> .	Lymph vessels of lower limbs and genital organs.
Ringworm	<i>Microsporum</i> , <i>Trichophyton</i> and <i>Epidermophyton</i>	Skin, nails and scalp.

Q.5. Identify a, b, c and d in the following table:

S. No.	Name of the human disease	Name of the causal bacteria/virus	Specific organ or its part affected
(i)	Typhoid	<i>Salmonella typhi</i> .	a
(ii)	Common cold	b	c
(iii)	Pneumonia	<i>Streptococcus pneumoniae</i>	d

Ans.

- a. small intestine
- b. Rhino virus
- c. nose and respiratory passage
- d. alveoli of lungs

Q.6. Name the host and the site where the following occur in the life-cycle of a malarial parasite:

- a. Formation of gametocytes
- b. Fusion of gametocytes

Ans.

	Host	Site of occurrence
a. Formation of gametocytes	Human <i>Anopheles</i> mosquito	Red blood cells
b. Fusion of gametocytes		Intestine

Q.7.

- a. **Why do the symptoms of malaria not appear immediately after the entry of sporozoites into the human body when bitten by female *Anopheles*? Explain.**
- b. **Give the scientific name of the malarial parasite that causes malignant malaria in humans.**

Ans.

- a. Malarial parasite completes its asexual cycle in liver cells and then it attacks the red blood cells (RBCs) resulting in their rupture. The ruptured RBCs release toxic substance called haemozoin that is responsible for the symptoms of malaria like chill and high fever. Thus, no symptoms appear in the infected person between the period the parasite enters the body, till RBCs release haemozoin.
- b. *Plasmodium falciparum*

Q.8. Name and explain the two types of immune responses in humans.

Ans. The two types of immunity are active immunity and passive immunity.

Active immunity: Immunity developed in the host body due to production of antibodies in response to antigens.

Passive immunity: When ready-made antibodies are directly given to protect the body against foreign agents.

OR

The two types of immunity are humoral immunity and cell-mediated immunity.

Humoral immunity: Immune responses given by antibodies found in the blood.

Cell-mediated immunity: Activation of T-lymphocytes mediate this immunity.

OR

The two types of immunity are primary immunity and secondary immunity.

Primary immunity: When our body encounters a pathogen for the first time, it produces primary response.

Secondary immunity: Subsequent encounter with the same pathogen generates highly intensified secondary response or secondary immunity.

Q.9. List the two types of immunity a human baby is born with. Explain the differences between the two types.

Ans. The two types of immunity a human baby is born with are innate and passive/acquired immunity. Innate immunity is a non-specific type of defence that provides barrier to the entry of antigens. Passive immunity is a pathogen-specific type of defence in which readymade antibodies are directly given to protect body against foreign agents. The foetus receives antibodies through the placenta.

Q.10. Name the two types of immune systems in a human body. Why are cell mediated and humoral immunities so called?

Ans. The two types of immune systems in a human body are innate and adaptive immunity.

Humoral immunity is called so because it consists of antibodies that are present in humors or body fluids, whereas cell-mediated immunity is provided by T-cells and defends body against viruses, fungi and some bacteria which enter host cells. T-cells recognise non-self cells and kill them.

Q.11. Name the two special types of lymphocytes in humans. How do they differ in their roles in immune response?

Ans.

B lymphocytes, T lymphocytes.

B-cells produce pathogen specific antibodies and are responsible for humoral immune response.

T-cells help the B-cells to produce antibodies and are responsible for cell mediated immunity.

Q.12. Name the different types of cells providing cellular barriers responsible for innate immunity in humans.

Ans. Polymorphonuclear leukocytes, monocytes, natural killer cells and macrophages.

Q.13. What is colostrum? Why is it important to be given to the newborn infants?

Ans.

The milk that comes out of the mammary glands during initial days of lactation is called colostrum. It contains several antibodies (IgA most abundantly) absolutely essential for developing resistance in the new-born babies.

Q.14. Describe the role of lymph nodes in providing immunity.

Ans. Lymph nodes trap microorganisms or other antigens. These trapped antigens activate lymphocytes present in the lymph and cause an immune response.

Q.15. State the functions of primary and secondary lymphoid organs in humans.

Ans. Primary lymphoid organs are the sites where immature lymphocytes differentiate into antigen sensitive lymphocytes.

Secondary lymphoid organs are the sites where the lymphocytes interact with antigens and proliferate to become effector cells.

Q.16.

- a. Name one primary and one secondary lymphoid organ in the human body.
- b. How do they differ in their functions?

Ans.

- a. Primary lymphoid organ: Bone marrow/thymus. (*Any one*)
Secondary lymphoid organ: Spleen/Lymph nodes/Mucosal associated lymphoid tissue (MALT). (*Any one*)
- b. Primary lymphoid organs are the sites where immature lymphocytes differentiate into antigen sensitive lymphocytes. Secondary lymphoid organs are the sites where the lymphocytes interact with antigens and proliferate to become effector cells.

Q.17.

- a. Name the lymphoid organ in humans where all the blood cells are produced.
- b. Where do the lymphocytes produced by the lymphoid organ mentioned above migrate and how do they affect immunity?

Ans.

- a. Bone marrow.
- b. The lymphocytes produced migrate to secondary lymphoid organs like spleen, lymph nodes, etc. They trap the microorganisms thereby activating the lymphocytes present in the lymph nodes and produce an immune response.

Q.18.

- a. **Highlight the role of thymus as a lymphoid organ.**
- b. **Name the cells that are released from the above mentioned gland. Mention how they help in immunity.**

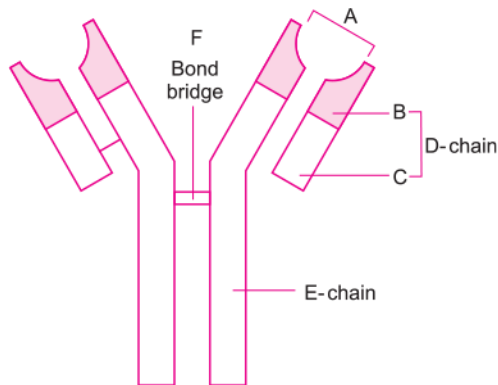
Ans.

- a. Immature lymphocytes differentiate into mature T-lymphocytes and become antigensensitive in thymus.
- b. T-lymphocytes are released from thymus. T-cells help B-cells to produce antibodies and provide cell-mediated immunity.

Q.19. How does spleen act as a lymphoid organ? Explain.

Ans. The spleen is a large bean-shaped organ. It mainly contains lymphocytes and phagocytes. It acts as a filter of the blood by trapping blood-borne microorganisms. Spleen also has a large reservoir of erythrocytes.

Q.20. Identify A, D, E and F in the diagram of an antibody molecule given below:



Ans.

A—Antigen binding site

D—Light chain

E—Heavy chain

F—Disulfide bridge.

Q.21. Why is an antibody represented as 'H₂L₂'?

Ans. Each antibody molecule has four polypeptide chains. The two smaller chains are called light chains while the two longer chains are called heavy chains. Therefore an antibody is represented as H₂L₂.

Q.22. Why does a doctor administer tetanus antitoxin and not a tetanus vaccine to a child injured in a roadside accident with a bleeding wound? Explain.

OR

Why is a person with cuts and bruises following an accident administered tetanus antitoxin? Give reasons.

Ans. Tetanus is caused by a microbe which has a deadly and fast action. Action of vaccine is slow and this delay may become fatal. Therefore, antitoxins are administered which neutralise the effect of the bacterial toxin.

Q.23. A student on a school trip started sneezing and wheezing soon after reaching the hill station for no explained reasons. But, on return to the plains, the symptoms disappeared. What is such a response called? How does the body produce it?

Ans. Such a response is called allergic reaction or allergy. On exposure to allergens like dust, pollens, etc., chemicals like histamine and serotonin are released from the mast cells, resulting in an allergic response.

Q.24. A young boy when brought a pet dog home started to complain of watery eyes and running nose. The symptoms disappeared when the boy was kept away from the pet.

Q. Name the type of antibody and the chemicals responsible for such a response in the boy.

Ans. Antibody: IgE; chemicals: Histamine and serotonin

Q. Mention the name of any one drug that could be given to the boy for immediate relief from such a response.

Ans. Drugs: Antihistamine, adrenalin, steroids. (*Any one*)

Q.23. Why is tobacco smoking associated with rise in blood pressure and emphysema (oxygen deficiency in the body)? Explain.

Ans. Tobacco has nicotine that stimulates the release of adrenaline and noradrenaline which raise blood pressure. Smoking tobacco releases carbon monoxide which reduces the concentration of haem-bound oxygen. This causes emphysema.

Q.24. When you go for a trek/trip to any high altitude places, you are advised to take it easy and rest for the first two days. Comment, giving reasons.

OR

Why do tribes who live in high altitude of Himalayas experience discomfort in respiration? How do they get adapted to survive in such a situation?

Ans. At high altitudes it is advised to take easy due to low oxygen availability. This may also cause altitude sickness. It is also advised to take rest because body compensates the low oxygen availability during rest by increasing RBC production and decreasing the binding capacity of haemoglobin, in turn increasing the breathing rate.

Q.27.

- a. Name the group of viruses responsible for causing AIDS in humans. Why are these viruses so named?**
- b. List any two ways of transmission of HIV infection in humans, other than sexual contact.**

Ans.

- a. Retrovirus. These are named so because they have RNA genome and reverse transcriptase enzyme which carries on the processes $RNA \rightarrow DNA \rightarrow RNA$.
- b. Infected blood transfusion/sharing syringes/needles children born to HIV mothers. (*Any two*)

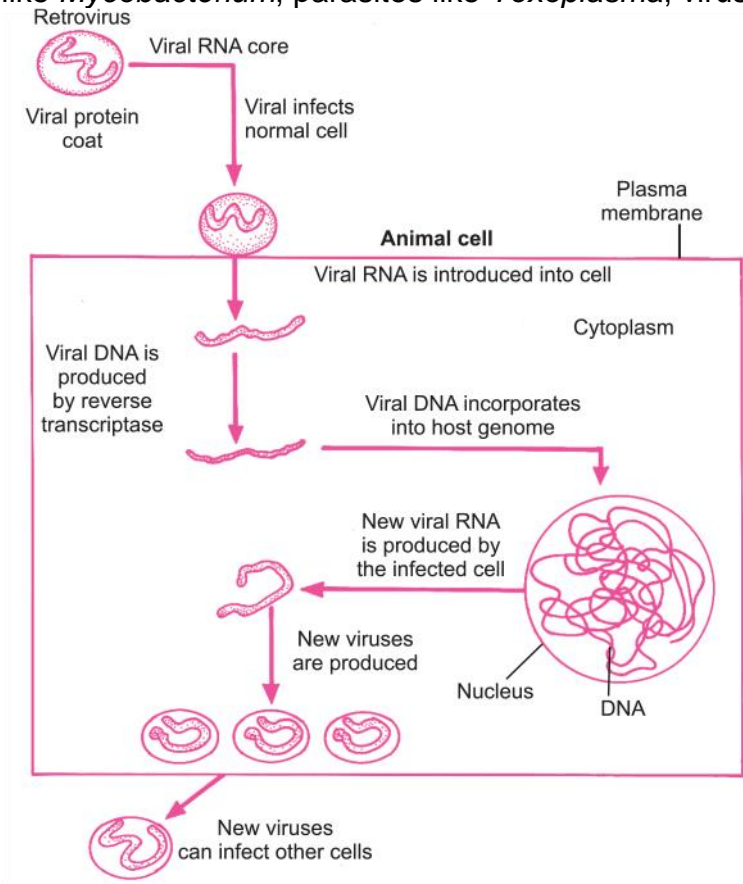
Q.28.

- a. Name the virus that causes AIDS in humans.**
- b. Explain the sequence of events that follows when this virus attacks to cause immune deficiency in humans.**

Ans.

- a. Human Immunodeficiency Virus.
- b. **Life cycle of HIV**
 - After getting into the body of a person, the virus enters the macrophages.
 - Here, RNA is replicated to form viral DNA by enzyme reverse transcriptase.
 - The viral DNA now gets incorporated into the host cell's DNA and directs the infected cells to produce viruses.
 - The macrophages continue to produce virus particles.
 - The virus particles enter helper T-lymphocytes (TH cells) in the blood, where they continue to replicate and produce viral progenies.
 - Thus, the number of helper T-lymphocytes progressively decreases in the body of the infected persons.
 - With the decrease in number of T-cells, the immunity also decreases. The person is unable to produce any immune response even against common bacteria

like *Mycobacterium*, parasites like *Toxoplasma*, viruses and fungi.



Replication of retrovirus

Q.29. Name the cells that act as HIV factory in humans when infected by HIV. Explain the events that occur in the infected cell.

OR

Name the type of cells the AIDS virus first enters into after getting inside the human body. Explain the sequence of events that the virus undergoes within these cells to increase their progeny.

Ans. Macrophages/Helper T-cells act as HIV factory.

The virus enters macrophages or helper T-cells where RNA genome of the virus forms viral DNA with the help of the enzyme reverse transcriptase. The viral DNA then gets incorporated into host cell's DNA and directs infected cells to produce new virus particles.

Q.30. Explain metastasis. Why is it fatal?

Ans. The cancerous cells are sloughed from the tumours and reach distant sites through blood, and wherever they get lodged in the body, they start a new tumour there. This property called metastasis is the most feared property of malignant tumours.

Q.31. Differentiate between benign and malignant tumours.

Ans.

S. No.	Benign tumour	Malignant tumour
(i)	It is a non-cancerous tumour.	It is a cancerous tumour.
(ii)	Benign tumour does not show metastasis and is non-invasive.	It shows metastasis and thus invades other body parts.
(iii)	It stops growth after reaching a certain size.	Malignant tumour shows indefinite growth.
(iv)	Limited adherence occurs amongst cells of benign tumour.	There is no adherence amongst cells. They tend to slip past one another.
(v)	It is less fatal to the body.	It is more fatal to the body.

Q.32. What is “withdrawal syndrome”? List any two symptoms it is characterised by.

Ans. It is the state experienced by addicts when their regular dose of alcohol/drug is abruptly discontinued. It is often characterised by anxiety, shakiness, nausea and sweating.

Q.33. How does smoking tobacco in human lead to oxygen deficiency in their body?

Ans. Smoking increases the carbon monoxide (CO) content in the blood which has greater affinity to haemoglobin than oxygen. CO forms a stable bond with haemoglobin and does not allow binding of oxygen. Smoking also damages alveolar walls, which reduces respiratory surface (emphysema).

Q.34. Name an opioid drug and its source plant. How does the drug affect the human body?

Ans. Heroin is an opioid drug obtained from the poppy plant *Papaver somniferum*. It is a depressant and slows down the body functions.

Q.35. Name the plant source of the drug popularly called “smack”. How does it affect the body of the abuser?

Ans. Plant source of 'smack' is *Papaver somniferum* or poppy. Smack is a depressant and slows down body functions.

Q.36. Name the plant source of cocaine. How does it affect the human body?

OR

Name the drug obtained from *Erythroxylum coca* and write its effects on the human body.

OR

Why do sports persons often fall a victim to cocaine addiction?

Ans. Plant source of cocaine is *Erythroxylum coca*. It has a potent stimulating action on central nervous system, producing a sense of euphoria and increased energy. Excessive dosage of cocaine causes hallucinations.

Q.37. Name the plant source of ganja. How does it affect the body of the abuser?

OR

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

Ans. Cannabinoids are obtained from the inflorescence of the plant *Cannabis sativa*. Marijuana, hashish, *charas*, *ganja* are some cannabinoids. These chemicals interact with cannabinoid receptors of the body, mainly present in the brain. Cardiovascular system is affected adversely.

Short Answer Questions-I (OIQ)

[2 Mark]

Q.1. Name and explain the type of barrier of innate immunity system which involve macrophages.

Ans. Innate immunity is the non-specific immunity which is present from birth and is inherited from parents. Cellular barrier/phagocytosis involve macrophages. The macrophages form an important component of this type of immunity. At the site of infection, the blood flow increases and so does the cellular components. Macrophages and neutrophils engulf the microbes and cellular debris whenever they happen to enter the body.

Q.2. How do B-cells direct humoral immunity?

Ans. The B-cell specific antigens stimulate B-cell production and it multiplies to produce a clone of plasma cells. The cells differentiated into memory and effector cells due to clonal selection. They produce antibodies that circulate in body fluid and kill the pathogens.

Q.3. Name and explain the types of barriers of innate immunity, where some cells release interferons when infected.

Ans. This type of barrier is called cytokine barrier. The cell infected by virus produce interferons which in turn protect the non-infected cells from further viral infection.

Q.4. Name and explain the types of barriers of innate immunity which involve histamine and prostaglandins.

Ans. Inflammatory barrier involves histamine and prostaglandins. Due to infection by microbe, the mast cells release histamine and prostaglandin which cause inflammation. As a result, the capillary wall becomes more permeable to phagocytes and some fluid containing serum protein with anti-bacterial activity. Ultimately, they inhibit and destroy the invading microorganisms.

Q.5. Name the type of immunity that is present at the time of birth in humans. Explain any two ways by which it is accomplished.

Ans. Innate immunity is present at the time of birth in humans. It is accomplished by providing different types of barriers.

Innate immunity

- It is present from the birth and is inherited from parents.
- It is non-specific.
- It is accomplished by providing different types of barriers.
 - a. **Physical barriers**
These barriers do not allow pathogens and foreign agents to enter the body, e.g., skin, mucous membranes of digestive, respiratory and urinogenital tracts trapping microorganisms.
 - b. **Physiological barriers**
Sweat, tears, acid in the stomach and saliva prevent microbial growth.
 - c. **Cellular barriers**
WBCs (polymorphonuclear leukocytes and monocytes, natural killer lymphocytes) and macrophages phagocytose and destroy microbes.
 - d. **Cytokine barriers**
Interferons produced by virus-infected cells protect non-infected cells from further viral infection.

Q.6. Name the type of immunity a baby is born with. How is it different from the one he gets from the mother's milk after birth?

Ans. A baby is born with innate immunity. The immunity he gets from the mother's milk is called acquired immunity. It is an example of passive immunity.

Q.7. What would happen to immune system, if thymus gland is removed from the body of a person?

Ans. Thymus is the primary lymphoid organ. In thymus gland, immature lymphocytes differentiate into antigen-sensitive lymphocytes. If thymus gland is removed from the body of a person, his immune system becomes weak. As a result the person's body becomes prone to infectious diseases.

Q.8. Name the cells that produce antibodies. Explain the main functions of these compounds.

Ans. Antibodies are produced by B-lymphocytes.

The main functions of antibodies include:

- i. Agglutination of particulate foreign matter or pathogen (bacteria and viruses).
- ii. They react with antigens and form Antigen–Antibody complex making it inactive or harmless.
- iii. Opsonisation or coating bacteria to facilitate their subsequent phagocytosis by other cells.

Q.9.

- i. **What is a vaccine? Give an example of a vaccine produced by recombinant DNA technology.**
- ii. **Name the disease against which DPT vaccine develops immunity?**

Ans.

- i. An inoculation stimulating the production of antibodies in the body is called vaccine. Hepatitis B vaccine from yeast was produced by recombinant DNA technology.
- ii. DPT provides immunity against diphtheria, pertussis and tetanus.

Q.10. What are allergens? How do human beings respond to them?

Ans. Allergens are substances which act as weak antigens and cause inappropriate and excessive immune response. Allergen being a harmless substance initiates antibody formation which in turn binds to the receptors on the mast cell. The mast cell releases chemicals such as histamines, which in turn cause inflammation of the mucous membranes. Many anti-allergic treatments suppress mast cells or neutralise histamines.

Q.11. What are interferons? How do they help in developing resistance to infection?

Ans.

The natural proteins (glycoproteins) produced by the cells of immune system in response to viral infection which protect non-infected cells from further infection are called interferons.

Interferons inhibit the viral replication within host cells, activate natural killer cells and macrophages, increase antigen presentation to lymphocytes and induce resistance of host cells to viral infection. When the antigen is presented to specific T-cells and B-cells, these cells multiply and remove the foreign substance.

Q.12. Define auto-immune disease. Give two examples.

Ans. Auto-immune disease refers to the disease when body's immune system due to genetic or other unknown reasons starts destroying self-cells and molecules, e.g., rheumatoid arthritis and systemic lupus.

Q.13. Which kind of immunity, active or passive, is produced by vaccination? Name the disease against which protection is provided by BCG vaccine.

Ans. Vaccination provides active immunity. BCG vaccine provides protection against tuberculosis.

Q.14. Why an immunosuppressive agent is taken after an organ transplant?

Ans. Our immune system is capable to differentiate between 'self' and 'non-self' cells/tissues. The graft (grafting) is a non-self tissue which may be rejected by our immune system. So, to prevent the rejection, immunosuppressants are taken after the transplant.

Q.15. How are auto-immune diseases different from immunodeficiency disease? Give one example of each in human.

Ans.

S. No.	Auto-immune disease	Immunodeficiency disease
(i)	When the immune system of the body starts attacking 'self-cells' and molecules. The disease is called auto-immune disease.	When the immune system fails to function properly against pathogen or antigen, it is called immunodeficiency disease.
(ii)	For example, rheumatoid arthritis.	For example, AIDS.

Q.16. 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.

Ans. Allergy is the exaggerated response of the immune system to certain antigens present in the environment. In metropolitan cities life style is responsible in lowering of

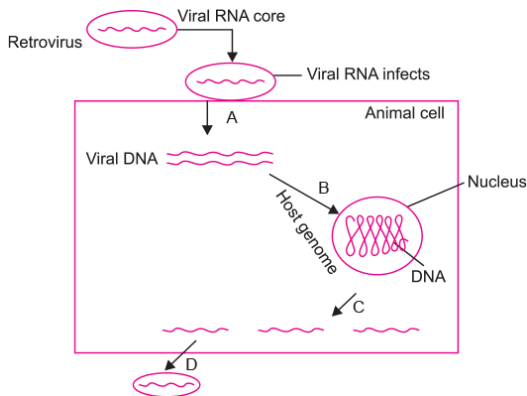
immunity and sensitivity to allergens. More polluted environment increases the chances of allergy in children. Some symptoms of allergic reactions are sneezing, watery eyes, running nose and difficulty in breathing.

Q.17. It was diagnosed by a specialist that the immune mechanism of the body of a patient has been suppressed. Name the disease the patient has been suffering from and the microbe responsible for it. Which part of the immune system does it affect and in what manner?

Ans. The patient is suffering from Acquired Immuno Deficiency Syndrome (AIDS). Causal organism is Human Immunodeficiency Virus (HIV).

HIV infects helper T-cells. HIV enters helper T-cells where it replicates and produces progeny viruses. The progenies liberated by lysis of host T-cells attack other helper T-cells. Repeated attacks result in progressive decrease in the number of T-cells and thus reducing immunity.

Q.18. Identify A, B, C and D in the replication of HIV (retrovirus).



Ans.

- A. Reverse transcription.
- B. Viral DNA incorporates into host genome.
- C. New viral RNA produced by infected cell.
- D. New viruses can infect other cells.

Q.19. Write full form of ELISA. Give an example of the clinical application of ELISA test.

Ans. ELISA stands for enzyme linked immuno-sorbent assay. It is a widely used diagnostic test for AIDS.

Q.20. What harm do cancerous cells cause?

Ans. Harm caused by cancerous cells:

- i. The cancerous cells may increase in numbers and size to cease normal function of the cells.
- ii. Cancerous cells compete with normal cells of the body for nutrients and in turn kill them.

Q.21. Name any two carcinogens. Also explain the term malignancy.

Ans.

UV rays and 5-bromouracil.

The property of tumour cells by which they move in the body fluid to different sites away from their site of origin is called malignancy.

Q.22. What is a carcinogen? Name one chemical carcinogen with its target tissue?

Ans.

The physical, chemical and biological agents which cause cancer are called carcinogens.

Chemical carcinogen: Asbestos acts on lungs.

Q.23.

- a. Explain the property that prevents normal cells from becoming cancerous.
- b. All normal cells have inherent characteristic of becoming cancerous. Explain.

Ans.

- a. By the contact inhibition property, normal cells do not change into cancerous cells.
- b. Several genes called cellular oncogenes (*c-onc*) or proto-oncogenes in normal cells which, when activated under certain conditions, could lead to oncogenic transformation of the cells leading to cancer.

Q.24. What are hallucinogens? Give their two examples. Mention their clinical use, if any.

Ans. These are a class of psychedelic drugs which affect cerebrum and sense organs to alter thought, feeling and perception, e.g., LSD (lysergic acid diethyl amides) and amphetamines. Clinically they are used to treat depression and insomnia.

Q.25. Name the blank spaces a, b, c and d in the table given below:

S. No.	Name of the drug	Plant source	Organ system affected
(i)	a	Poppy plant	b

(ii)	Marijuana	c	d
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Ans.

- a. Morphine
- b. Central nervous system
- c. *Cannabis sativa*
- d. Cardiovascular system.

Q.26. If a regular dose of drugs or alcohol is not provided to an addicted person, he shows some withdrawal symptoms. List any four such withdrawal symptoms.

Ans. The withdrawal symptoms are:

- a. Anxiety
- b. Shakiness
- c. Nausea
- d. Sweating

Q.27. Write the biological (binomial) names of causal organisms of the following diseases:

Q. Typhoid

Ans. *Salmonella typhi*

Q. Pneumonia

Ans. *Streptococcus pneumoniae*

Q.28. Write the biological (binomial) names of causal organisms of the following diseases:

Q. Elephantiasis (Filariasis)

Ans. *Wuchereria bancrofti* and *Wuchereria malayi*

Q. Amoebiasis

Ans. *Entamoeba histolytica*

Short Answer Questions-II (PYQ)

[3 Marks]

Q.1. Name a human disease, its causal organism, symptoms (any three) and vector, spread by intake of water and food contaminated by human faecal matter.

Ans.

i. Typhoid

- It is caused by pathogenic bacterium *Salmonella typhi*.
- It is spread by contaminated food and water.
- It generally enters the small intestine and then migrates to other organs through blood.
- Typhoid fever can be confirmed by Widal test.
- Mary Mallon, called Typhoid Mary, was a cook and a typhoid carrier who continued to spread the disease for several years through the food prepared by her, before it was discovered.

Symptoms

- a. Constant high fever (39°C to 40°C)
- b. Weakness
- c. Stomach pain
- d. Loss of appetite
- e. Constipation
- f. Headache
- g. Intestinal perforation and death may occur in severe cases.

ii. Amoebic dysentery (Amoebiasis)

- It is caused by an intestinal endoparasite, *Entamoeba histolytica*, found in large intestine of humans.
- Housefly acts as mechanical carrier and transmits the parasite from faeces of infected person to the food.
- Infection takes place through contaminated food and water.

Symptoms

- a. Abdominal pain
- b. Constipation
- c. Cramps
- d. Stool with excess mucous and blood clots.

iii. Filariasis/Elephantiasis

- It is caused by filarial worms, *Wuchereria bancrofti* and *Wuchereria malayi*.
- Female *Culex* mosquito is the vector.

Symptoms

- a. Inflammation of organs in which they live
- b. Blockage of lymph vessels of lower limbs resulting in swelling. Lower limbs appear like legs of elephant, thus the name.
- c. Genital organs may also be affected, leading to deformation.

Q.2. List the specific symptoms of typhoid. Name its causative agent.

Ans. Specific symptoms of typhoid are:

- i. Constant high fever (39° to 40°C)
- ii. Weakness
- iii. Stomach pain
- iv. Loss of appetite

Its causative agent is *Salmonella typhi*.

Q.3.

- a. Name the causative agent of typhoid in humans.
- b. Name the test administered to confirm the disease.
- c. How does the pathogen gain entry into the human body? Write the diagnostic symptoms and mention the body organ that gets affected in severe cases.

OR

Name the bacterium that causes typhoid. Mention two diagnostic symptoms. How is this disease transmitted to others?

Ans.

Typhoid

- It is caused by pathogenic bacterium *Salmonella typhi*.
- It is spread by contaminated food and water.
- It generally enters the small intestine and then migrates to other organs through blood.
- Typhoid fever can be confirmed by Widal test.
- Mary Mallon, called Typhoid Mary, was a cook and a typhoid carrier who continued to spread the disease for several years through the food prepared by her, before it was discovered.

Symptoms

- a. Constant high fever (39°C to 40°C)
- b. Weakness
- c. Stomach pain
- d. Loss of appetite
- e. Constipation
- f. Headache
- g. Intestinal perforation and death may occur in severe cases.

Q.4. Mention the name of the causal organism, symptoms and the mode of transmission of the disease Amoebiasis.

OR

- a. Name the protozoan parasite that causes amoebic dysentery in humans.
- b. Mention two diagnostic symptoms of the disease.
- c. How is this disease transmitted to others?

OR

- a. Name the agent that causes amoebiasis and the human body organ that it infects.
- b. Write the symptoms and the mode of transmission of the disease.

Ans. Amoebic dysentery (Amoebiasis)

- It is caused by an intestinal endoparasite, *Entamoeba histolytica*, found in large intestine of humans.
- Housefly acts as mechanical carrier and transmits the parasite from faeces of infected person to the food.
- Infection takes place through contaminated food and water.

Symptoms

- a. Abdominal pain
- b. Constipation
- c. Cramps
- d. Stool with excess mucous and blood clots.

Q.5. Name any two organisms that are responsible for ringworms in humans. Mention two diagnostic symptoms. Name the specific parts of the human body where these organisms thrive and explain why.

Ans. *Microsporum/Trichophyton/Epidermophyton*. Symptoms: Dry/scaly lesion on skin/nails/scalp, intense itching. These thrive in body groin or between toes. They thrive better in heat/moisture/perspiration.

Q.6.

- i. Write the scientific names of the two species of filarial worms causing filariasis.
- ii. How do they affect the body of infected person(s)?
- iii. How does the disease spread?

Ans. Filariasis/Elephantiasis

- It is caused by filarial worms, *Wuchereria bancrofti* and *Wuchereria malayi*.
- Female *Culex* mosquito is the vector.

Symptoms

- Inflammation of organs in which they live
- Blockage of lymph vessels of lower limbs resulting in swelling. Lower limbs appear like legs of elephant, thus the name.
- Genital organs may also be affected, leading to deformation.

Q.7. List the specific symptoms of pneumonia. Name the causative organism.

Ans. Specific symptoms of pneumonia are:

- fever,
- cough,
- headache,
- chills.

It is caused by *Streptococcus pneumoniae* and *Haemophilus influenzae*.

Q.8. Trace the life-cycle of malarial parasite in the human body when bitten by an infected female *Anopheles*.

Ans. *Plasmodium falciparum* is the malarial parasite.

Life cycle of Plasmodium

- Plasmodium requires two hosts to complete its life cycle—human and mosquito.
- The infected female *Anopheles* mosquito transfers the infectious form of Plasmodium, i.e., sporozoites to the human body by biting.
- The sporozoites reach the liver cells, where they multiply.
- This is followed by their attack on red blood cells resulting in their rupture.
- The ruptured RBCs release a toxin called haemozoin, which is responsible for high recurring fever, chills and shivering.
- These parasites enter the female *Anopheles* mosquitoes when they bite an infected person.
- In the body of mosquitoes, they fertilise and multiply in the stomach wall.
- Sporozoites are now stored in the salivary gland of mosquito till it is again transferred to human body by a mosquito bite. After entering the human body, all the events are repeated.

Q.9.

a. Name the respective forms in which the malarial parasite gains entry into (i) Human body and (ii) Body of female *Anopheles*.

- b. Name the hosts where the sexual and the asexual reproductions of malarial parasites occur respectively.
- c. Name the toxin responsible for the appearance of symptoms of malaria in humans. Why do these symptoms occur periodically?

Ans.

- a.
 - i. Sporozoite
 - ii. Gametocytes.
- b. Sexual reproduction occurs in mosquito and asexual reproduction takes place in human body.
- c. Haemozoin. Parasites after entering the fresh RBCs take 48 to 72 hours to complete the erythrocytic cycle, rupturing the erythrocytes. They then burst to release toxic substance called haemozoin and the symptoms like chill and high fever occurs periodically

Q.10.

- a. Name the stage of *Plasmodium* that gains entry into the human body.
- b. Trace the stages of *Plasmodium* in the body of female *Anopheles* after its entry.
- c. Explain the cause of periodic recurrence of chill and high fever during malarial attack in humans.

Ans.

- a. *Plasmodium* enters the human body as sporozoites.
- b. When a female *Anopheles* mosquito bites an infected person, the parasites enter the mosquito's body and undergo further development. The parasites multiply within them to form sporozoites that are stored in salivary glands until their transfer to human body.
- c. The rupture of RBCs release a toxic substance called haemozoin, which is responsible for the chill and high fever recur.

Q.11. Explain the role of the following in providing defence against infection in human body:

Q. Histamines

Ans. Histamines: These are chemicals which cause inflammatory responses.

Q. Interferons

Ans. Interferons: These are glycoproteins which protect non-infected cells from further viral infection.

Q. B-cells

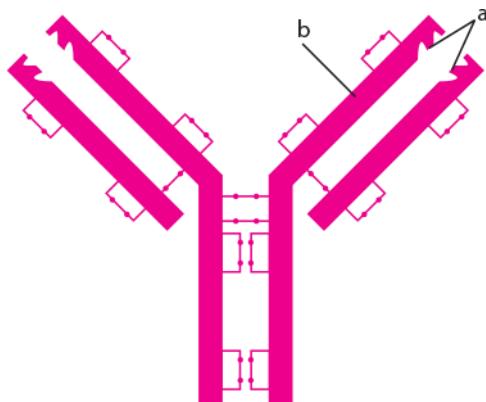
Ans. B-cells: These produce proteins called antibodies in response to pathogens into the blood to fight with them.

Q.12. Write the events that take place when a vaccine for any disease is introduced into the human body.

Ans. The vaccine contains proteins of pathogen or inactivated/weakened pathogen. When a dose of vaccine is introduced into the human body, it behaves as an antigen and the body produces antibodies in response to the antigen. This response generates active immunity. The antibodies thus produced will neutralise the pathogenic agents during actual infection. The vaccines also generate memory B- and T-cells that recognise the pathogen quickly on subsequent exposure and overwhelm the invaders with a massive production of antibodies.

Q.13.

- i. **What does the given diagram illustrate?**
- ii. **Name the parts labelled 'a' and 'b'.**
- iii. **Name the type of cells that produce this molecule.**



Ans.

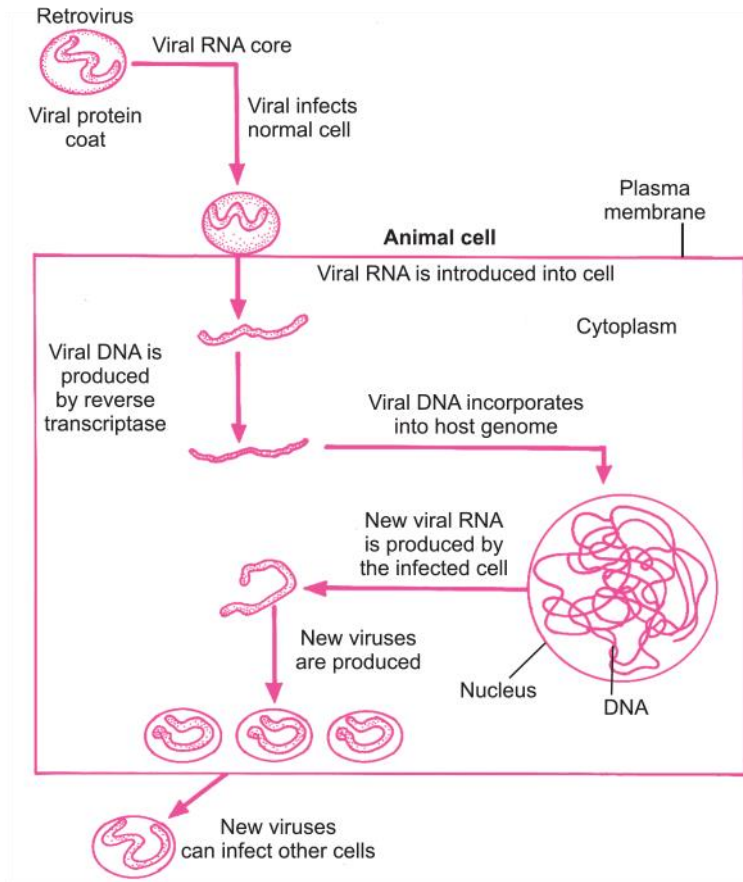
- i. An antibody molecule
- ii. (a) Antigen binding site , (b) Heavy chain
- iii. B-lymphocytes (B-cells).

Q.14.

- a. **What precaution(s) would you recommend to a patient requiring repeated blood transfusion?**
- b. **If the advise is not followed by the patient, there is an apprehension that the patient might contract a disease that would destroy the immune system of his/her body. Explain with the help of schematic diagram only how the immune system would get affected and destroyed.**

Ans.

- a. A patient requiring repeated blood transfusion must ensure that the donor's blood has been screened for HIV and other pathogens before transfusion.
- b.



Replication of retrovirus

Q.15. Name the cells HIV (Human Immunodeficiency Virus) gains entry into after infecting the human body. Explain the events that occur in these cells.

Ans. HIV virus gains entry into Macrophages and (Helper) T-lymphocytes after getting into the human body.

Events that occur in the cells are:

- i. Viral RNA forms DNA by reverse transcription using the enzymes reverse transcriptase and directs the infected cells to produce viral particles.
- ii. Macrophages continue to produce viral particles and function as HIV factories.
- iii. The viral particles simultaneously enters into helper T-lymphocytes, replicates and produce viral progenies.
- iv. The number of T-lymphocytes progressively decreases in the body of the infected person.

- v. During this person suffers from bouts of fever, weight loss. Also decrease in the number of cells leads to weakening of immune system.

Q.16. A farmer while working on his farm was bitten by a poisonous snake. The workers in the farm immediately rushed him to the nearby health centre. The doctor right away gave him an injection to save his life. What did the doctor inject and why? Explain.

Ans. The doctor injected an antivenom. The antivenom contains preformed antibodies which when injected act on the pathogen immediately provide protection by providing passive immunity

Q.17.

- a. **Why is there a fear amongst the guardians that their adolescent wards may get trapped in drug/alcohol abuse?**
- b. **Explain 'addiction' and 'dependence' in respect of drugs/alcohol abuse in youth.**

Ans.

- a. Adolescents are easily affected by (or are vulnerable to) peer pressure. Curiosity, need for adventure and excitement, and experimentation constitute common causes for motivation. A child's natural curiosity motivates him/her to experiment. Television, movies, newspapers, internet also promote drug use.
- b. Addiction is the psychological attachment to certain effects such as euphoria or temporary feeling of well-being.
Dependence is the tendency of the body to show withdrawal syndrome or symptoms if regular doses of drug/alcohol is abruptly discontinued.

Q.18. Write the source and the effect on the human body of the following drugs:

Q. Morphine

Ans. Morphine: It is obtained from poppy plant *Papaver somniferum*. It binds to specific opioid receptors present in central nervous system and gastrointestinal tract.

Q. Cocaine

Ans. Cocaine: It is obtained from coca plant *Erythroxylum coca*. It interferes with the transport of the neurotransmitter dopamine.

Q. Marijuana

Ans. Marijuana: It is obtained from *Cannabis sativa*. It affects the cardiovascular system of the body.

Q.19. Answer the following questions:

Q. It is generally observed that the children who had suffered from chicken-pox in their childhood may not contract the same disease in their adulthood. Explain giving reasons the basis of such an immunity in an individual. Name this kind of immunity.

Ans. The first infection of chicken pox produces a primary response and antibodies are generated against chicken pox virus, subsequent encounter with the same virus elicits a highly intensified secondary response, due to the memory cells formed during the first encounter. This kind of an immunity is active immunity.

Q. What are interferons? Mention their role.

Ans. Proteins secreted by viral infected cells, which protects non-infected cells from viral infection are called interferous. When α -interferon is given to cancer patient it activates immune system and destroys tumour.

Q.20. Answer the following questions:

Q. All human beings have cellular oncogenes but only a few suffer from cancer disease. Give reasons.

Ans. All humans have cellular oncogenes or proto-oncogenes, but only a few suffer from cancer because cancer only occurs on activation of oncogenes. This activation is induced by carcinogens which can be physical, chemical or biological. The chemical carcinogens present in tobacco smoke have been identified as a major cause of lung cancer.

Q. How is a malignant tumour different from a benign tumour?

Ans.

Differences between types of tumours

S. No.	Benign tumour	Malignant tumour
(i)	It is a non-cancerous tumour.	It is a cancerous tumour.
(ii)	Benign tumour does not show metastasis and is non-invasive.	It shows metastasis and thus invades other body parts.
(iii)	It stops growth after reaching a certain size.	Malignant tumour shows indefinite growth.
(iv)	Limited adherence occurs amongst cells of benign tumour.	There is no adherence amongst cells. They tend to slip past one another.
(v)	It is less fatal to the body.	It is more fatal to the body.

Q.21. Answer the following questions:

Q. Name a drug used (i) as an effective sedative and pain killer (ii) for helping patients to copewith mental illnesses like depression, but often misused.

Ans.

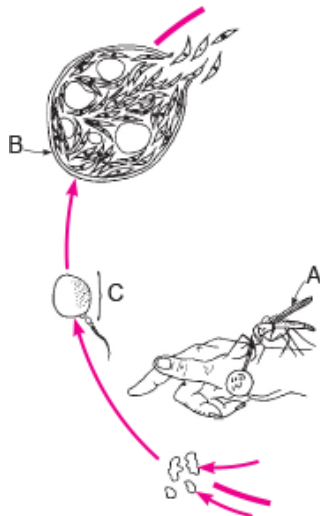
- i. Morphine
- ii. Lysergic acid diethyl amides (LSD).

Q. How does the moderate and high dosage of cocaine affect the human body?

Ans. Cocaine has a potent simulating action on central nervous system producing a sense of euphoria and increased energy. Excessive dosage of cocaine causes hallucinations.

Q.22. Study a part of the life cycle of malarial parasite given alongside. Answer the questions that follow:

- a. Mention the roles of 'A' in the life cycle of the malarial parasite.
- b. Name the event 'C' and the organ where this event occurs.
- c. Identify the organ 'B' and name the cells being released from it.



Ans.

- a. A—Gametocytes of *Plasmodium* enter the mosquito when it bites a malarial patient and feed on blood.
- b. C—Fertilisation. It occurs in the intestine of mosquito.
- c. B—Salivary gland of the female *Anopheles* mosquito. These release sporozoites of *Plasmodium*.

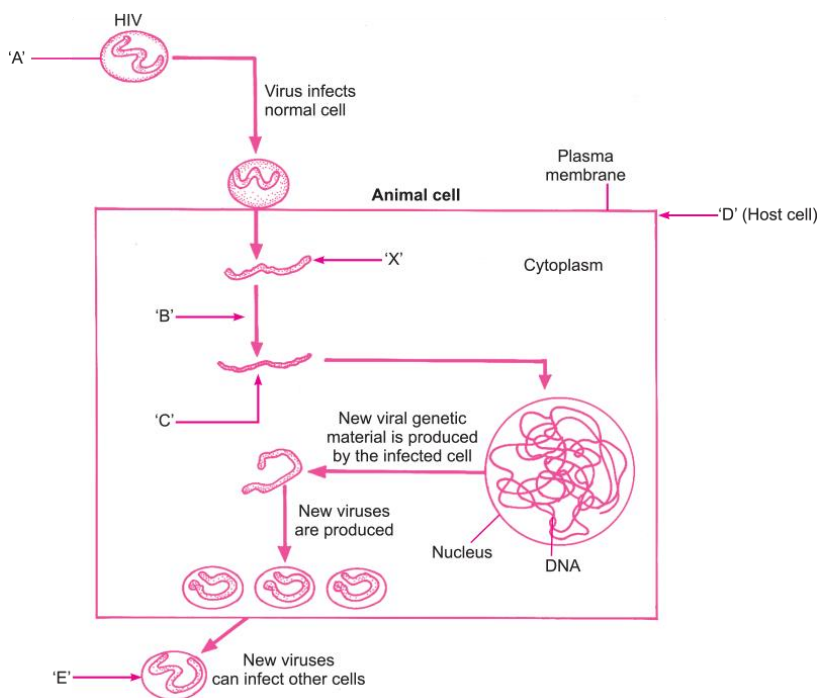
Q.23. On a visit to a Hill station, one of your friend suddenly become unwell and felt uneasy.

- List two symptoms you would look for the term it to be due to allergy.
- Explain the response of the body to an allergen.
- Name two drugs that can be recommended for immediate relief.

Ans.

- Sneezing, watery eyes, running nose and difficulty in breathing are symptoms of allergy. (*Any two*)
- In response to an allergen, the body releases antibodies of IgE type.
- Antihistamine, adrenalin, steroids. (*Any two*)

Q.24.



Study the diagram showing replication of HIV in humans and answer the following questions accordingly:

- Write the chemical nature of the coat 'A'.
- Name the enzyme 'B' acting on 'X' to produce molecule 'C'. Name 'C'.
- Mention the name of the host cell 'D' the HIV attacks first when it enters into the human body.
- Name the two different cells that the new viruses 'E' subsequently attack.

Ans.

- Coat 'A' is made up of protein.
- The enzyme 'B' is reverse transcriptase, 'C' is viral DNA.
- The host cell 'D' is macrophage.

- iv. The new viruses 'E' subsequently attack macrophages and helper T-lymphocytes.

Q.25. During a school trip to 'Rohtang Pass', one of your classmate suddenly developed 'altitude sickness'. But, she recovered after sometime.

- a. **Mention one symptom to diagnose the sickness.**
- b. **What caused the sickness?**
- c. **How could she recover by herself after sometime?**

Ans.

- a. Nausea/fatigue/heart palpitation
- b. The sickness was caused due to low atmospheric pressure at high altitude because of which the body was deprived of oxygen.
- c. The body compensates low oxygen availability by increasing RBC production decreasing the binding capacity of haemoglobin and by increasing breathing rate.

Q.26. Prior to a sports event, blood and urine samples of sports persons are collected for drug tests.

- a. **Why is there a need to conduct such tests?**
- b. **Name the drugs the authorities usually look for.**
- c. **Write the genetic names of two plants from which these drugs are obtained.**

Ans.

- a. Such tests are conducted to detect drug abuse to ensure fair game.
- b. The authorities look for cannabinoids, cocaine, coca alkaloid, coke, crack, hashish, *charas*, *ganja* and hemp plant extract.
- c. These drugs are obtained from *Cannabis*, *Atropa*, *Erythroxyllum*, *Datura*.

Q.27. A heavily bleeding bruised road accident victim was brought to a nursing home. The doctor immediately gave him an injection to protect him against a deadly disease.

- a. Write what did the doctor inject into the patient's body.
- b. How do you think this injection would protect the patient against the disease?
- c. Name the disease against which this injection was given and the kind of immunity it provides.

Ans.

- a. Tetanus antitoxins/Tetanus toxoid.

- b. The preformed antibody injected act on the pathogen immediately to provide protection.
- c. This injection was given against tetanus and it provides passive immunity.

Q.28. A team of students are preparing to participate in the interschool sports meet. During a practice session you find some vials with labels of certain cannabionoids..

- a. Will you report to the authorities? Why?
- b. Name a plant from which such chemicals are obtained.
- c. Write the effect of these chemicals on human body.

Ans.

- a. Yes. Because these may be abused by sports person.
- b. *Cannabis* (sativa)
- c. Effects cardiovascular system of the body.

Q.29. A group of youth were having a 'rave party' in an isolated area and was raided by police. Packets of 'smack' and syringes with needles were found littered around.

- a. Why is taking 'smack' considered an abuse?
- b. Write the chemical name of 'smack' and the name of its source plant.
- c. Syringes and needles used by the youth for taking the drug could prove to be very fatal. Why?

Ans.

- a. Taking smack is considered as abuse because it is highly addictive. It is a depressant and slows down body functions. It causes psychological and physical dependance.
- b. Its chemical name is diacetylmorphine and is obtained from poppy plant, *Papaver Somniferum*.
- c. Drugs taken intravenously (direct injection into the vein using a needle and syringe) are much likely to acquire serious infections like AIDS and hepatitis B. The viruses, which are responsible for these diseases are transferred from one person to another by sharing infected needles and syringes.

Short Answer Questions-II (OIQ)

[3 Marks]

Q.1.

- a. What is an 'allergic reaction'?
- b. Name any two drugs used to quickly reduce the symptoms of allergy.
- c. Why do more and more children in metro cities of India suffer from allergies and asthma?

Ans.

- a. The exaggerated response of the immune system to certain antigens present in the environment is called allergic reaction.
- b. Anti-histamine, adrenaline, steroids.

[Any two]

- c. In metro cities, due to deteriorating air quality the sensitivity to the environment and allergens have increased in children. This has resulted in lowering of immunity due to modern day lifestyle.

Q.2. To which category of cells do B-cells and T-cells belong? How do they differ from each other with reference to their formation and response to antigens?

Ans.

B-cells and T-cells belong to the category of lymphocytes, *i.e.*, leucocytes (WBC).

S. No.	B-lymphocytes	T-lymphocytes
(i)	They mature in bone marrow.	They mature in thymus gland.
(ii)	They produce antibody against antigen.	They directly attach the antigen or direct B-cells to produce antibody.
(iii)	They do not respond to organ transplantation.	They respond to organ transplantation.

Q.3. What is the basic principle of vaccination? How do vaccines prevent microbial infections? Name the organism from which hepatitis B vaccine is produced.

Ans. Principle of vaccination is based on the property of 'memory' of immune system. In vaccination, a preparation of antigenic proteins of pathogens or inactivated/live but weakened pathogens is introduced into the body. The antigens generate primary immune response by producing antibodies along with forming memory B-cells and T-cells. When the vaccinated person is attacked by the same pathogens, second time/subsequent time the existing memory B-cells and T-cells recognise the antigen and overwhelm the invaders with massive production of lymphocytes and antibodies. Hepatitis B vaccine is produced from yeast.

Q.4. A person has been diagnosed to be HIV+.

- i. Name the disease and the test which the person has to undergo.
- ii. Write the full name of the pathogen involved and describe its structure.
- iii. Which particular cells of this person are likely to get destroyed?

OR

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

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

Ans.

- i. Name of the disease is AIDS and the test is ELISA — Enzyme Linked Immuno-Sorbent Assay.
- ii. Human Immunodeficiency Virus.

Structure of HIV:

- a. It has an envelope enclosing the genetic material which is single stranded RNA.
- b. The envelope has spikes with receptors capable of recognising antigen receptors found on helper T-cells.
- iii. It affects/destroys helper T-cells.

Q.5. When someone buys packets of cigarettes, cannot miss the statutory warning that is present on the packing which warns against smoking and says how it is injurious to health. Yet, smoking is very prevalent in our society, both among young and old. Advise the adolescents about the importance of avoiding smoking. (Mention any six points.)

Ans.

- i. Tobacco in cigarettes contains a large number of chemical substances including nicotine, an alkaloid. Nicotine stimulates adrenal gland to release adrenaline and nor-adrenaline into blood circulation, both of which raise blood pressure and increase heart rate.
- ii. Smoking is associated with increased incidence of cancers of lung, urinary bladder, throat and oral cavity.
- iii. It is responsible for bronchitis and emphysema.
- iv. It is associated with increased risk of coronary heart disease, gastric ulcer, etc.

- v. Smoking increases carbon monoxide (CO) content in blood and reduces the concentration of haem-bound oxygen. This causes oxygen deficiency in the body.

Q.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?

Ans. Preventive barrier to protect body are:

- i. The mucus coating of the epithelium lining of the gut helps in trapping microbes entering the body.
- ii. Saliva in the mouth and hydrochloric acid in gastric juice secreted by stomach prevent microbial growth.

This type of immunity is innate immunity.

Q.7. 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 precaution should be taken to avoid such reactions.

Ans. The condition is called allergy. Mast cells are responsible for such reactions. To avoid such reactions following precautions must be taken.

- i. Use of drugs like antihistamine, adrenaline and steroids quickly reduces the symptoms.
- ii. Avoid contact with substances to which a person is hypersensitive.

Q.8. Name the type and give the effect of the following drugs in human.

Q. LSD

Ans. LSD: It is a hallucinogen. It affects the cerebrum and sense organs, changing the feelings, thoughts and perceptions of an individual.

Q. Morphine

Ans. Morphine: It is opiate narcotic. It suppresses the normal functioning of brain and relieve intense pain but temporarily.

Q. Barbiturates

Ans. Barbiturates: It is a sedative and tranquiliser. It suppresses brain's activity and creates a feeling of relaxation, drowsiness and sleepiness.

Q.9. Your classmate complains of headache and cough. The doctor confirms that he is suffering from Pneumonia and not common cold, on the basis of certain

symptoms. List these symptoms. Mention any two precautions to be followed to prevent the spread of this disease.

Ans. Doctor confirms pneumonia on the basis of the following symptoms— fever/chills/grey-blue lips and finger nails (*any two*).

It is not common cold as the following symptoms are not observed - Nasal congestion/sore throat/ hoarseness (*any two*).

Precautions to be followed are:

- i. Cover the nose when near the patient.
- ii. Do not share glasses and utensils or articles used by the infected person.

Q.10. A person is born with a hereditary disease with a weakened immune system due to deficiency of an enzyme. Suggest a technique for complete cure for this disease, identify the deficient enzyme and explain the technique used for cure.

Ans. Gene therapy can completely cure this disease.

The disease is due to ADA (Adenosine deaminase) deficiency.

Lymphocytes from the blood of the patient are grown in a culture. A functional ADA cDNA is introduced into these lymphocytes, which are subsequently returned to the patient. The permanent cure is done by introducing ADA cDNA into cells at early embryonic stages.

Q.11. A doctor prescribed morphine as a sedative and pain killer to your cousin who had undergone surgery. Even after recovery, he craved for the prescribed medicine. What do you conclude about his condition, had he continued with the same medication? After appraising yourself, what measures will you suggest to him to overcome this problem? Briefly explain any two.

Ans. His condition is drug dependence. It is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if regular dose of drugs is abruptly discontinued. Because of perceived benefits, drugs are frequently used repeatedly from which the person may not be able to get out.

Following measures can be taken to overcome this problem:

- i. Education and counseling to face problems and stresses and to channelise the energy into healthy pursuits like reading, music, yoga and other extracurricular activities.
- ii. Seeking help from parents to guide the person appropriately and immediately.
- iii. Seeking professional and medical help to the person to get rid of the problem completely with sufficient efforts and will power (*any two*).

Q.12. Tobacco smoking, chewing or snuffing is very injurious to health of humans. Justify.

Ans. Tobacco contains nicotine. It stimulates the adrenal gland to release adrenaline and noradrenaline, which raises blood pressure and increases heart rate. This results in increased incidence of cancer of lungs urinary bladder and throat, bronchitis/emphysema/coronary heart disease/ gastric ulcer etc. It also increases carbon monoxide content in blood and reduces concentration of haembound oxygen.

Q.13. Answer the following questions:

Q. What is meant by addictive disorder?

Ans. It is a disorder with psychological attachment to certain effects such as euphoria and a temporary feeling of well-being associated with drug and alcohol. In this disorder, body continuously require these drugs even when they are not needed.

Q. Name any two opiate narcotics.

Ans. Heroin and morphine.

Q. Mention any two ways how opiate narcotics affect human body.

Ans.

- a. They suppress the brain function and reduce tension.
- b. Heroin is a depressant.

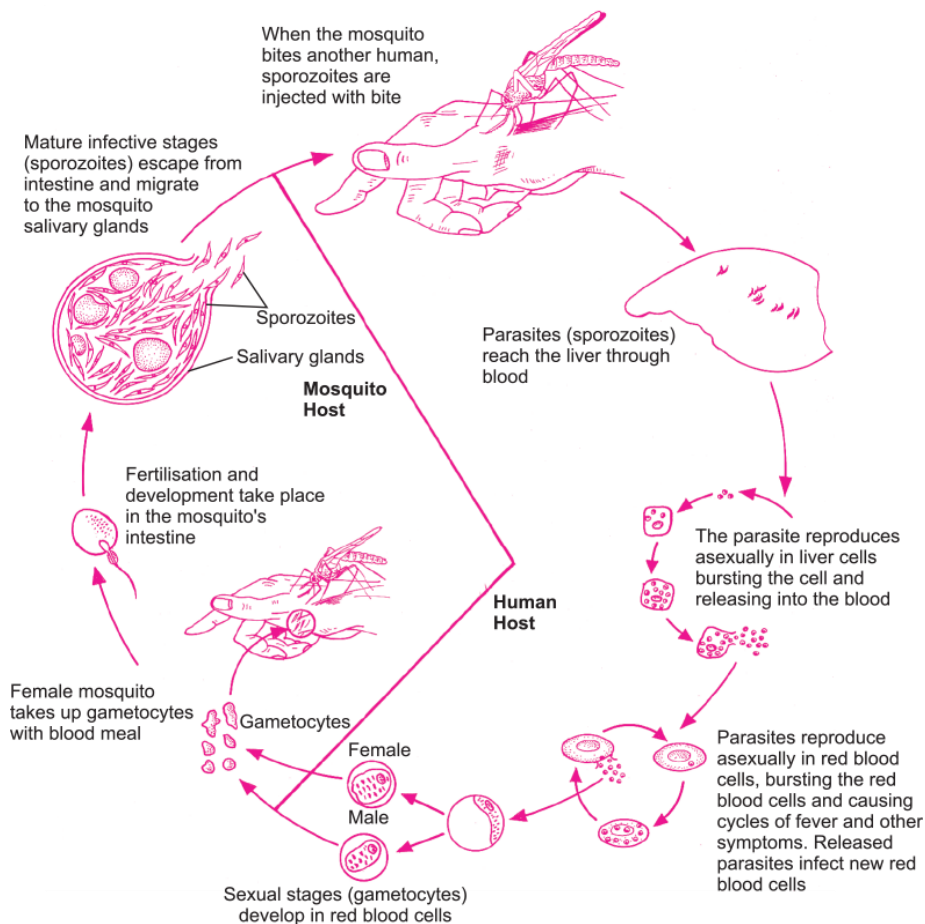
Long Answer Questions (PYQ)

[5 Marks]

Q.1. Describe the asexual and sexual phases of life cycle of *Plasmodium* that causes malaria in humans.

Ans. Life cycle of Plasmodium

- Plasmodium requires two hosts to complete its life cycle—human and mosquito.
- The infected female Anopheles mosquito transfers the infectious form of Plasmodium, i.e., sporozoites to the human body by biting.
- The sporozoites reach the liver cells, where they multiply.
- This is followed by their attack on red blood cells resulting in their rupture.
- The ruptured RBCs release a toxin called haemozoin, which is responsible for high recurring fever, chills and shivering.
- These parasites enter the female Anopheles mosquitoes when they bite an infected person.
- In the body of mosquitoes, they fertilise and multiply in the stomach wall.
- Sporozoites are now stored in the salivary gland of mosquito till it is again transferred to human body by a mosquito bite. After entering the human body, all the events are repeated.

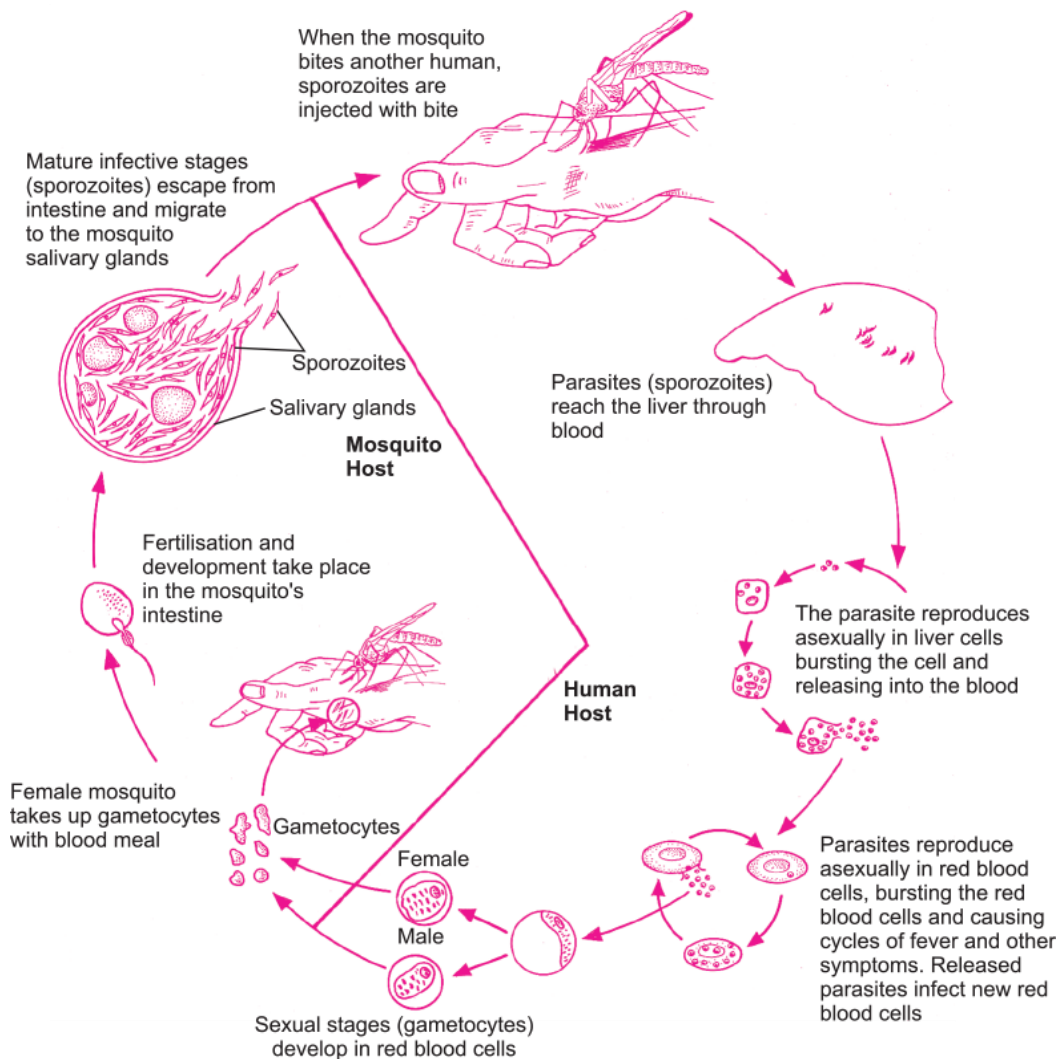


Stages in the life cycle of Plasmodium

Q.2. Name the form of *Plasmodium* that gains entry into the human body. Explain the different stages of its life-cycle in the human body.

Ans. *Plasmodium vivax*

- Plasmodium requires two hosts to complete its life cycle—human and mosquito.
- The infected female Anopheles mosquito transfers the infectious form of Plasmodium, i.e., sporozoites to the human body by biting.
- The sporozoites reach the liver cells, where they multiply.
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- Sporozoites are now stored in the salivary gland of mosquito till it is again transferred to human body by a mosquito bite. After entering the human body, all the events are repeated.



Stages in the life cycle of Plasmodium

Q.3. Under polio prevention programme, infants in India were given polio vaccines on a large scale at regular intervals to eradicate polio from the country.

Q. What is a vaccine? Explain how does it impart immunity to the child against the disease.

Ans.

- Vaccination is the process of introduction of weakened or inactivated pathogens or proteins (vaccine) into a person to provide protection against a disease.
- Vaccination provides immunisation after a time gap.
- The vaccine generates memory B- and T-cells that recognise the pathogen on subsequent exposure and produce an intense immune response.

Q. With the help of an example each, differentiate between active and passive immunity.

Ans.

S. No.	Active immunity	Passive immunity
(i)	It is developed due to contact with pathogen (dead or living) or its antigen, that leads to production of antibodies in the host body.	It is developed when readymade antibodies are injected into the body.
(ii)	It has no or only few side effects.	It may cause a reaction.
(iii)	It is slow but long lasting.	It is fast but lasts only for few days.
(iv)	It takes time to develop its response.	It is used when the immune response has to be faster.
(v)	For example, vaccination for polio, etc.	For example, administration of tetanus antitoxins, antibodies in colostrum, etc.

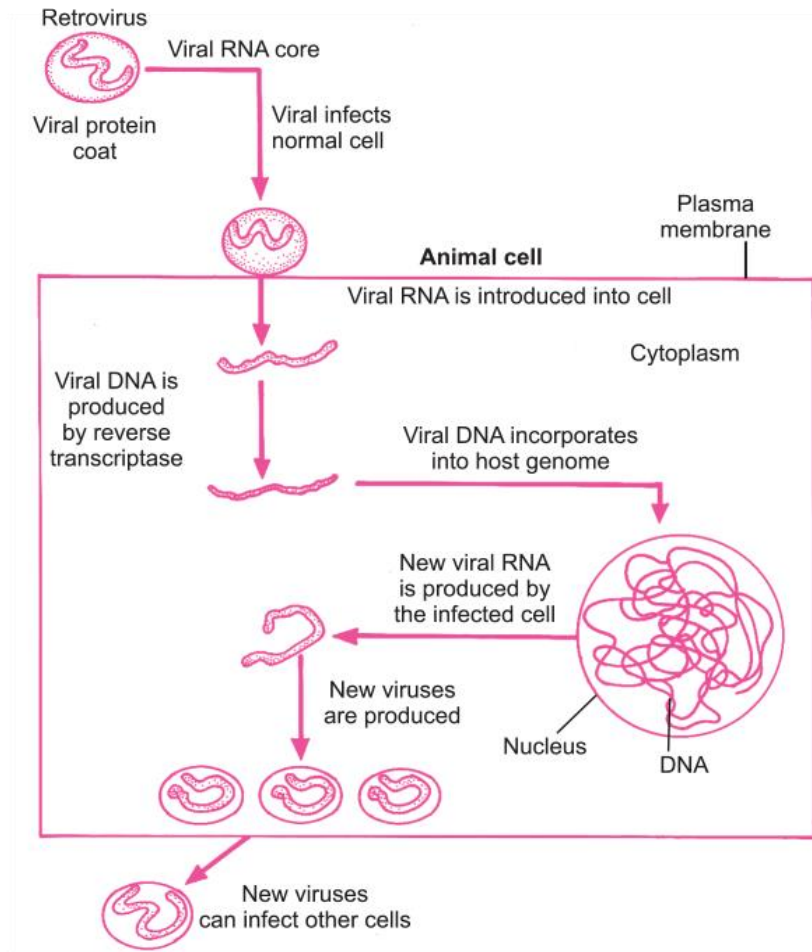
Q.4. Explain the process of replication of a retrovirus after it gains entry into the human body.

OR

- a. How does a Human Immunodeficiency Virus (HIV) replicate in a host?**
- b. How does a HIV-infected patient lose immunity?**
- c. List any two symptoms of this disease.**

Ans.

(a)



Replication of Retrovirus

(b) An HIV-infected patient loses immunity due to loss of T-lymphocytes.

(c) Symptoms are fever, diarrhoea, susceptibility to other diseases and prone to microbial infection.

Q.5.

- Name and explain any four lymphoid organs present in humans.
- Categorise the named lymphoid organs as primary or secondary lymphoid organs, giving reasons.

Ans.

- Primary lymphoid organs**
 - The organs where lymphocytes originate and mature to become antigen-sensitive, e.g., bone marrow and thymus, are called primary lymphoid organs.
 - Bone marrow**
 - It is the primary lymphoid organ where all blood cells including lymphocytes originate.

- Bone marrow provides the micro-environment for the development and maturation of B-lymphocytes.
- b. **Thymus**
 - Thymus is a lobed organ located near the heart and beneath the breastbone.
 - It is quite large at the time of birth but reduces with age.
 - It provides the micro-environment for the development and maturation of T-lymphocytes.
- ii. **Secondary lymphoid organs**
 - The organs where lymphocytes interact with the antigen and proliferate to become effector cells, e.g., spleen, lymph nodes, tonsils, Peyer's patches of small intestine and appendix are called secondary lymphoid organs.
 - a. **Spleen**
 - It is a large bean-shaped organ and contains lymphocytes and phagocytes.
 - It acts as a filter of the blood by trapping blood-borne microorganisms.
 - It has a large reservoir of erythrocytes.
 - b. **Lymph nodes**
 - These are small solid structures present at different points along the lymphatic system.
 - They trap the microorganisms or other antigens that enter the lymph and tissue fluid.
 - Antigens trapped in the lymph nodes activate the lymphocytes and produce an immune response.
 - c. **Mucosal associated lymphoid tissue (MALT)**
 - It is formed of masses of lymphoid tissue lining the mucosa of respiratory, digestive and urinogenital tracts.
 - 50 per cent of the lymphoid tissue in human body is formed by MALT.

Q.6.

- a. **Cancer is one of the most dreaded diseases of humans. Explain 'Contact inhibition' and 'Metastasis' with respect to the disease.**
- b. **Name the group of genes which have been identified in normal cells that could lead to cancer and how they do so?**
- c. **Name any two techniques which are useful to detect cancers of internal organs.**
- d. **Why are cancer patients often given α -interferon as part of the treatment?**

Ans.

- a. Contact inhibition is the property of normal cells in which contact with other cells inhibits their uncontrolled growth.
Metastasis is the property in which tumour cells reach distant sites in the body, through blood.

- b. Proto oncogenes or Cellular oncogenes.
These genes when activated under certain condition could lead to oncogenic transformation of the cells.
- c. Biopsy/radiography/CT/MRI (*Any two*)
- d. α -interferon activates immune system and destroys the tumour.

Q.7. Your school has been selected by the Department of Education to organise and host an interschool seminar on “Reproductive Health—Problems and Practices”. However, many parents are reluctant to permit their wards to attend it. Their argument is that the topic is “too embarrassing.” Put forth four arguments with appropriate reasons and explanation to justify the topic to be very essential and timely.

Ans.

- i. The issue of puberty and adolescence need to be addressed effectively with the respective age group because many changes take place in the body during adolescence of which they are supposed to be aware of.
- ii. To bring in awareness about their reproductive health and its effect on their physical, emotional and social being.
- iii. To address the increase in sex abuse and sex crimes in our country.
- iv. Myths and misconceptions related to reproductive issues need to be cleared at the right time.

Q.8. You have attended a birthday party hosted by one of your classmates. You found some guests at the party sitting in a corner making a lot of noise and consuming ‘something’. After a while one of the boys from the group started screaming, behaving abnormally and sweating profusely. On enquiry you found that the group members were taking drugs.

Q. Would you inform your parents/school authorities? Yes/No. Give reasons in support of your answer.

Ans. Yes, so that it does not become a habit by repeated use. Consumption of drugs may cause harmful effects.

Q. Prepare a note to be circulated amongst the schoolmates about the sources and dangers of any two drugs.

Ans.

Drug	Source	Danger
Cocaine	<i>Erythroxylum coca</i>	Affects central nervous system and interferes with transport of dopamine.
Opioids/Heroin/Smack	Latex of <i>Papaver somniferum</i> (poppy plant)	Slows down body functions.

Cannabinoids	<i>Cannabis sativa</i>	Affects cardiovascular system
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Q. Write any two ways that you will suggest to your school principal so as to promote awareness amongst the youth against the use of these drugs.

Ans. Awareness can be promoted by organising poster making competitions, street plays, talks by experts and interviews of experts.

Q.9. Answer the following questions:

Q. Name and explain giving reasons, the type of immunity provided to the newborn by the colostrum and vaccinations.

Ans. Colostrum provides passive immunity, because the infant gets antibodies from the mother's body directly for protection.

Vaccinations provide active immunity because in this case microbes are injected into the body do develop immunity slowly.

Q. Name the type of antibody

- i. present in colostrum
- ii. produced in response to allergens in human body.

Ans.

- a. IgA
- b. IgE

Q.10. Answer the following questions:

Q. Name the types of lymphoid organs, lymph nodes and thymus are. Explain the role played by them in causing immune response.

Ans.

Thymus is primary lymphoid organ and lymph nodes are secondary lymphoid organs.

Thymus provides the microenvironment for immature lymphocytes to differentiate into antigen-sensitive lymphocytes.

Lymph nodes serve to trap the microorganisms or other antigens, which happen to get into the lymph and tissue fluid. Antigens trapped in the lymph nodes are responsible for the activation of lymphocytes present there and cause the immune response.

Q. Differentiate between innate immunity and acquired immunity.

Ans.

S. No.	Innate immunity	Acquired immunity
(i)	It is present from birth and is inherited from parents.	It is not present from the birth.
(ii)	It is non-specific.	It is pathogen specific.
(iii)	The various physical, physiological, cellular, cytokine barriers are the basis of innate immunity.	The memory cells formed by B and T-cells are the basis of acquired immunity.
(iv)	The innate immunity remains throughout life.	The acquired immunity can be short-lived or life long.

Long Answer Questions (OIQ)

[5 Marks]

Q.1. Write the scientific name of the bacteria that causes pneumonia. What happens in this disease? What are its symptoms?

Ans. Pneumonia

- It is caused by *Streptococcus pneumoniae* and *Haemophilus influenzae*.
- They infect alveoli (air-filled sacs) of the lungs where the alveoli get filled with a fluid resulting in the decrease of respiratory efficiency of the lungs.
- It is spread by inhaling droplets/aerosol from infected persons and sharing glasses and utensils with an infected person.

Symptoms

- a. Fever
- b. Chills
- c. Cough
- d. Headache
- e. In severe cases, lips and finger nails turn gray to bluish in colour.

Q.2. Name three species of fungi that cause ringworm. Mention the symptoms of this disease?

Ans. Ringworm

- It is caused by fungi of genera *Microsporum*, *Trichophyton* and *Epidermophyton*.
- Human infection occurs either through contact with an infected person or from soil. It also spreads through towels, clothes, combs, etc., of the infected persons.

Symptoms

- a. Dry and scaly lesions on skin, nails and scalp.
- b. Lesions are accompanied by intense itching.

Q.3. Discuss the different barrier of innate immunity.

Ans. It is accomplished by providing different types of barriers.

- a. **Physical barriers** These barriers do not allow pathogens and foreign agents to enter the body, e.g., skin, mucous membranes of digestive, respiratory and urinogenital tracts trapping microorganisms.
- b. **Physiological barriers** Sweat, tears, acid in the stomach and saliva prevent microbial growth.
- c. **Cellular barriers** WBCs (polymorphonuclear leukocytes and monocytes, natural killer lymphocytes) and macrophages phagocytose and destroy microbes.
- d. **Cytokine barriers** Interferons produced by virus-infected cells protect non-infected cells from further viral infection.

Q.4. Discuss the role of lymphoids in the immune response. Explain the different types of lymphoid organs giving two examples of each type in human.

Ans.

The lymphoid organs are those organs where lymphocytes originate, mature and proliferate for body's immune system.

Lymphoid organs are of two types:

- i. **Primary lymphoid organs**
 - The organs where lymphocytes originate and mature to become antigen-sensitive, e.g., bone marrow and thymus, are called primary lymphoid organs.
 - a. **Bone marrow**
 - It is the primary lymphoid organ where all blood cells including lymphocytes originate.
 - Bone marrow provides the micro-environment for the development and maturation of B-lymphocytes.
 - b. **Thymus**
 - Thymus is a lobed organ located near the heart and beneath the breastbone.
 - It is quite large at the time of birth but reduces with age.
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- ii. **Secondary lymphoid organs**
 - The organs where lymphocytes interact with the antigen and proliferate to become effector cells, e.g., spleen, lymph nodes, tonsils, Peyer's patches of small intestine and appendix are called secondary lymphoid organs.

- a. **Spleen**
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 - These are small solid structures present at different points along the lymphatic system.
 - They trap the microorganisms or other antigens that enter the lymph and tissue fluid.
 - Antigens trapped in the lymph nodes activate the lymphocytes and produce an immune response.
- c. **Mucosal associated lymphoid tissue (MALT)**
 - It is formed of masses of lymphoid tissue lining the mucosa of respiratory, digestive and urinogenital tracts.
 - 50 per cent of the lymphoid tissue in human body is formed by MALT.

Q.5. What are the two groups of cells that work for specific immunity? Explain four unique features of specific immunity.

Ans. T-lymphocytes and B-lymphocytes work for specific immunity. Features of specific immunity are as follows:

- i. **Specificity:** Specific antibody response to specific antigen.
- ii. **Memory:** During the first interaction of antigen with B-cells and T-cells, few cells are stored as memory cell which encounter vigorously in second infection.
- iii. **Distinction between self and non-self:** The immune system can recognise foreign particles and kill them without killing its own or self cells.
- iv. **Diversity:** The immune system provides various or diverse antibodies to kill or destroy diverse antigens.

Q.6. Explain the different ways of diagnosing cancer.

Ans. Cancer detection

- a. **Blood and bone marrow tests** are done for increased cell counts in case of leukemia.
- b. **Histopathological study or biopsy:** In biopsy, a piece of the suspected tissue cut into thin sections is stained and examined under microscope by a pathologist.
- c. **Radiography:** X-rays are used to detect cancer of the internal organs.
- d. **Computed tomography:** It uses X-rays to generate a three-dimensional image of the internal of an object.
- e. **Resonance imaging:** Non-ionising radiation and strong magnetic field are used in MRI to accurately detect pathological and physiological changes in the living tissue.
- f. **Monoclonal antibodies:** Antibodies against cancer-specific antigens are also used for detection of certain cancers

Q.7. Describe the different methods for treatment of cancer.

Ans. Cancer treatment

- The common approaches for treatment of cancer are:
 - a. **Surgery:** The tumour cells are removed with the help of surgery to check the spread of cancerous cells.
 - b. **Radiation therapy:** A lethal irradiation of tumour cell is done, taking proper care of the normal tissues surrounding the tumour mass.
 - c. **Chemotherapy:** Cancerous cells are killed by several chemotherapeutic drugs. These drugs exhibit side effects like hair loss, anaemia.
 - d. **Immunotherapy:** In this method, biological modifiers like α -interferons are used which activate the immune system and help in destroying the tumour.

Q.8. Enumerate the different measures for control and prevention of drug/alcohol abuse among adolescent.

Ans.

- i. Avoid undue peer pressure.
- ii. Educating and counselling the problems and stresses to avoid disappointments and failures in life.
- iii. Seeking help from parents and peers.
- iv. Looking for danger signs to take appropriate measures on time.
- v. Seeking professional and medical help whenever required.

Q.9. What is cancer? How is a cancer cell different from normal cell? How do normal cells attain cancerous nature?

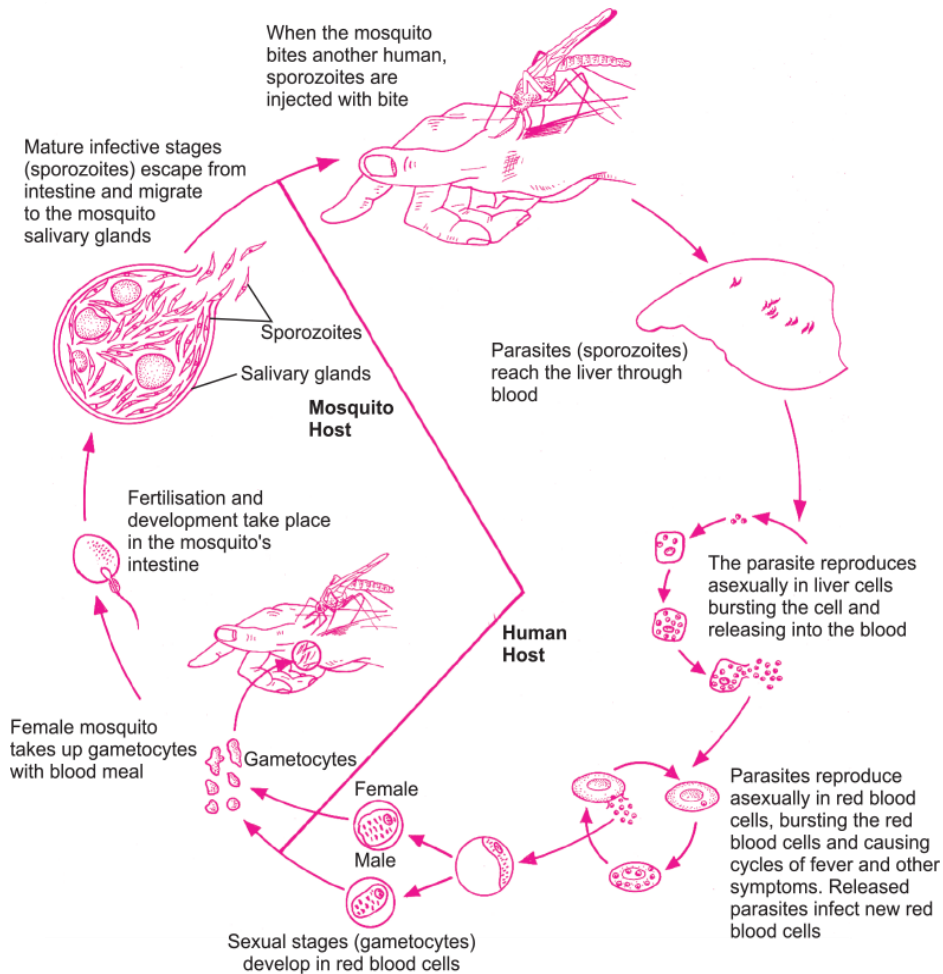
Ans. An abnormal and uncontrolled division of cells is termed as cancer.

S.No.	Cancer cell	Normal cell
(i)	Cancer cells divide in an uncontrolled manner.	Normal cells divide in a controlled manner.
(ii)	These cells do not show contact inhibition.	These cells show contact inhibition.
(iii)	Lifespan is indefinite.	Lifespan is definite.

In our body, 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 a cell. The normal cells when lose this property, become cancerous, giving rise to masses of cells called tumours. Transformation of normal cells into cancerous cells is induced by some physical, chemical or biological agents (carcinogens).

Q.10. Malarial parasite '*Plasmodium*' completes its life cycle in two hosts. Draw its complete life cycle and explain various stages it follows throughout its life.

Ans.



Stages in the life cycle of *Plasmodium*

Stages:

- The stage in which the parasite enters in the body of humans through saliva of mosquito— sporozoite stage.
- Asexual reproduction of sporozoites in liver cells, resulting into bursting of those cells and releasing outside into the blood.
- Sporozoites infect RBCs, cause them to get burst and represented by repeated cycles of fever. Released parasites also infect other RBCs.
- Parasites then follow sexual stage in RBCs which is called as ring signet stage and appears as a ring inside the RBCs under microscope. Usually presence of malarial parasite in humans is identified by pathologists by this stage.
- Female mosquito takes up gametocytes with the blood of host. Fertilisation and development takes place in the intestine of mosquito.

- f. From intestine, parasite comes to the salivary glands from where it reaches to human body and that is how the cycle continues.

Q.11. Explain the following in context of cancer:

Q. Benign tumour

Ans. Benign tumours are the masses of cells which remain confined to their original location and do not spread to other parts of the body and cause little damage.

Q. Malignant tumour

Ans. Malignant tumours are the masses of proliferating cells called neoplastic or tumour cells. These grow very rapidly, invading and damaging the surrounding normal tissues.

Q. Oncogens/Carcinogens

Ans. Transformation of normal cells into cancerous, neoplastic cells may be induced by physical, chemical or biological agents. These agents are called carcinogens. For example X-rays, gamma rays, UV radiations and some chemicals like EtBr.

Q. Oncogenes

Ans. The genes which may lead to oncogenic transformations of the cells are called oncogenes.

Q. Contact inhibition

Ans. Contact inhibition—Whenever normal cells come in contact with each other, after a definite time they inhibit each other's excess growth and multiplication. This property of normal cells is called contact inhibition which maintains the normal shape and size of the body. But cancer cells appear to have lost this property which results in their uncontrolled growth and multiplication.

Q.12. Why do some adolescents start taking drugs? How can the situation be avoided?

Ans. Reasons for alcohol abuse in adolescents:

- i. Social pressure.
- ii. Curiosity and need for adventure, excitement and experiment.
- iii. To escape from stress, depression and frustration.
- iv. To overcome hardships of daily life.
- v. Unstable or unsupportive family structure.

For measures to avoid taking drug are as follows:

- i. Avoid undue peer pressure.
- ii. Educating and counselling the problems and stresses to avoid disappointments and failures in life.

- iii. Seeking help from parents and peers.
- iv. Looking for danger signs to take appropriate measures on time.
- v. Seeking professional and medical help whenever required.