CHAPTER 8

HUMAN HEALTH AND DISEASE

Long Answer Questions [3 marks]

Q. 1. (a) Name the causative agents of pneumonia and common cold.

(b) How do these differ in their symptoms?

(c) Mention two symptoms common to both.

Ans. (a) Pneumonia is caused by Streptococcus pneumoniae/Haemophilus influenzae and that of common cold is Rhinoviruses.

(b) Different symptoms:

S. No.	Pneumonia	Common cold
(*i*)	Infects alveoli of lungs	Infects nose & respiratory passage
(*ii*)	Symptoms: Chills, lips/fingers may turn grey to black	Symptoms: Sore throat, hoarseness

(c) Common symptoms:

(i) In both the cases the infected person is inflicted with cough.

(ii) In both the cases the patient suffers from headaches

Q. 2. 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/Epideromophyton. Symptoms: Dry/scaly lesion on skin/nails/scalp, intense itching. These organisms thrive in body groin or between toes. They thrive better in heat/moisture/ perspiration.

Q. 3. (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) The name of the toxin is 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. 4. (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. 5. Explain the role of the following in providing defence against infection in human body:

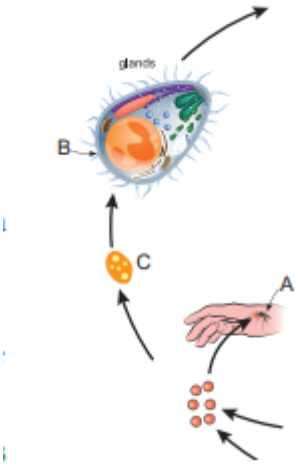
(i) Histamines

(ii) Interferons

(iii) B-cells

Ans. (i) Histamines: These are chemicals which cause inflammatory responses. (ii) Interferons: These are glycoproteins which protect non-infected cells from further viral infection. (iii) B-cells: These produce proteins called antibodies in response to pathogens into the blood to fight with them.

Q. 6. Study a part of the life cycle of malarial parasite given below and 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. 7. 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-cells and T-cells that recognise the pathogen quickly on subsequent exposure and overwhelm the invaders with a massive production of antibodies.

Q. 8. (a) 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.

(b) What are interferons? Mention their role.

Ans. (a) 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.

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

Q. 9. (a) How does the human body respond when vaccine is introduced into it?

(b) It is said that vaccinations are a must for a healthy society. Justify.

Ans. (a) B-cells assisted by T-cells produce antibodies against weakened antigens, which have been introduced as vaccine. These antibodies neutralise the pathogens (during actual infection) and also generate memory B-cells and T-cells.

(b) B and T memory cells recognise the pathogen in case of actual infection and produce antibodies to kill the pathogen. Thus the population will remain healthy if they are vaccinated prior to the infection.

Q. 10. 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. 11. 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. 12. 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. It is not common cold as the following symptoms are not observed - Nasal congestion/sore throat/hoarseness.

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. 13. (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.

Q. 14. 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. 15. 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. 16. 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. 17. On a visit to a Hill station, one of your friend suddenly become unwell and felt uneasy.

(a) List two symptoms you would look for the term it to be due to allergy.

(b) Explain the response of the body to an allergen.

(c) Name two drugs that can be recommended for immediate relief.

Ans. (a) Sneezing, watery eyes, running nose and difficulty in breathing are symptoms of allergy.

(b) In response to an allergen, the body releases antibodies of IgE type.

(c) Antihistamine, adrenalin, steroids.

Q. 18. 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. 19. 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, Erythroxylum, Datura.

Q. 20. 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) Cannabinoids effect cardiovascular system of the body.

Long Answer Questions [5 marks]

Q. 1. Malarial parasite 'Plasmodium' completes its life cycle in two hosts. Explain various stages it follows throughout its life.

Ans. Stages:

(a) The stage in which the parasite enters in the body of humans through saliva of mosquito—sporozoite stage.

(b) Asexual reproduction of sporozoites in liver cells, resulting into bursting of those cells and releasing outside into the blood.

(c) Sporozoites infect RBCs, cause them to get burst and represented by repeated cycles of fever. Released parasites also infect other RBCs.

(d) 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.

(e) 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. 2. (a) Name and explain giving reasons, the type of immunity provided to the new born by the colostrum and vaccinations.

(b) Name the type of antibody

(i) present in colostrum

(ii) produced in response to allergens in human body.

Ans. (a) 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.

(b) (i) IgA (ii) IgE

Q. 3. 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. 4. (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

(d) a-interferon activates immune system and destroys the tumour.

Q. 5. 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. 6. 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.

(a) Would you inform your parents/school authorities? Yes/No. Give reasons is support of your answer.

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

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

(*b*)

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

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

Q. 7. Explain the following in context of cancer:

(a) Benign tumour (b) Malignant tumour (c) Oncogens/Carcinogens (d) Oncogenes (e) Contact inhibition

Ans. (a) 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.

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

(c) 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.

(d) The genes which may lead to oncogenic transformations of the cells are called oncogenes.

(e) Contact inhibition—Whenever normal cells come in contact with each other, after a definite time they inhibit each others' 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.