Human Health & Disease

1. In which of the following conditions/diseases is there a substantial increase in the activity of mast cells observed in the human body ? (2024)

(A) Typhoid

(B) Allergy

(C) Ascariasis

(D) AIDS

Ans. (B) Allergy

2. A farmer while working on his farm was bitten by a poisonous snake. He was rushed to a nearby health centre where the doctor gave him an injection to save his life. (2024)

(i) What did the doctor inject and why ?

Ans.

- Readymade or preformed antibodies or antitoxins against the snake venom,

- A quick immune response is required in this case.

(ii) Name the kind of immunity provided by this injection.

Ans. Passive immunity

3. Why do organic farmers not recommend complete eradication of insect pests ? Explain giving reason. (2024)

Ans. The organic farmers hold the view that complete eradication of pests is not only possible but also undesirable because without them beneficial predatory and parasitic insects which
depend upon them as food or hosts will not survive / One of the key belief of organic farmers is that biodiversity furthers health. Greater biodiversity leads to more sustainable ecosystem.

4. Identify A, B, C, D, E and F in the table given below : (2024)

Name of Human Disease	Causative Organism	Symptoms
Pneumonia	Streptococcus	'A'
Typhoid	'B'	High fever, weakness, headache, stomach pain

Common Cold	Rhino virus	'C'
Ringworm	'D'	Dry scaly lesions on body parts, redness, itching
Ascariasis	Ascaris	'E'
'F'	Entamoeba histolytica	Constipation, cramps, stools with mucous and blood clots

Ans.

A – Fever / chills / cough / headache / greyish blue lips and nails / severe problem in Respiration,

B – Salmonella typhi,

C – Nasal congestion / discharge / sore throat / cough / hoarseness /tiredness,

D – Microsporum / Trichophyton / Epidermophyton,

E – Internal bleeding / fever / muscular pain / anaemia / blockage of intestinal passage,

F – Amoebiasis / Amoebic dysentery.

5. Name and explain the property present in normal cells but is lost in cancer cells. (2024)

Ans.

- Contact Inhibition is present in normal cells but not in cancer cells,

- When normal cells come in contact with other cells it inhibits their uncontrolled growth.

6. All normal human cells have genes that may become cancerous under certain conditions. Name them and explain how. (2024)

Ans. Cellular oncogenes / Proto-oncogenes, when activated under certain conditions could lead to oncogenic transformation of the cells.

7. State the role of the following techniques in detection and diagnosis of cancer :

(2024)

(1) Biopsy and Histopathology

(2) Magnetic Resonance Imaging

Ans.

(1) Biopsy and histopathology – A piece of suspected tissue cut into thin sections is stained, and examined under microscope by pathologist for increased cell counts.

(2) MRI – detects cancer of internal organs, uses strong magnetic fields and non–ionising radiations to detect pathological and physiological changes in living tissue

Previous Years' CBSE Board Questions

7.1 Common Diseases in Humans

MCQ

1. Select the pathogen mismatched with the symptoms of disease caused by it from the list given below:

(a) Entamoeba histolytica: Constipation, abdominal pain.

(b) Epidermophyton: Dry scaly lesions on nail.

(c) Wuchereria bancrofti: Chronic inflammation of lymphatic vessels of lower limb.

(d) Haemophilus influenzae: Blockage of the intestinal passage.

(2023)

2. The diagnostic test that confirms typhoid in humans is

(a) ELISA (b) Widal

(c) MRI (d) amniocentesis.

(NCERT Exemplar, 2020)

VSA (1 mark)

3. Name two diseases whose spread can be controlled by the eradication of Aedes mosquitoes.

(2018)

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

(Delhi 2014)

5. Why is Gambusia introduced into drains and ponds?

(AI 2014)

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

(Foreign 2014)

SA I (2 marks)

7. Ringworm is one of the most common infectious fungal diseases in humans. Name any two genera of fungi which cause ringworm and state any of its two symptoms. **(Term II, 2021-22)**

8. Name one air borne and a water borne disease in humans. List one specific symptom of each one of them.

(2020)

9. Causative organisms of some diseases gain entry into human body through mosquito bites and make humans suffer from the disease.

Name one such:

(i) protozoan disease along with the scientific name of the causative organism.

(ii) helminthes disease along with the scientific name of the causative organism.

(2020C)

10. List the symptoms of ascariasis. How does a healthy person acquire this infection? **(AI 2014)**

SA II (3 marks)

11. "Plasmodium protozoan needs both a mosquito and a human host for its continuity." Explain. **(2023)**

12. We all must work towards maintaining good health because 'health is wealth. Enlist any six ways of achieving good health.
(2023)

13. Compare the symptoms of ascariasis, amoebiasis and elephantiasis.
(2020)

14. (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.
(2019)

15. Name a human disease, its causal organism, symptoms (any three) and vector, spread by intake of water and food contaminated by human faecal matter.
(AI 2017)

16. (a) State what happens in the human body when malarial parasites infected RBCs burst to release the parasites in the blood.

(b) Mention the specific sites in the host body where production of

(i) sporozoites and

(ii) gametocytes take place in the life cycle of the malarial parasites.
(Delhi 2015C)

17. Mention any two human diseases caused by roundworms. Name their causative agents and their mode of transmission into the human body.
(AI 2015C)

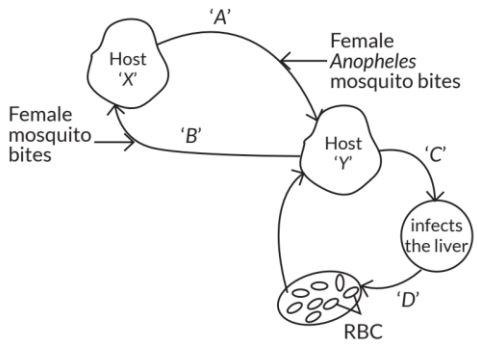
18. At what stage is Plasmodium picked up by the female Anopheles? Describe the life cycle of the parasite in this insect.
(AI 2015C)

19. (a) Name the causative organisms for the following diseases:

(i) Elephantiasis, (ii) Ringworm, (iii) Amoebiasis

(b) How can public hygiene help control such diseases?
(Delhi 2014C)

20. The diagram shows the life cycle of a pathogenic protozoan.



(i) Name the parasitic stage that is being transferred from host 'X' to host 'Y.

(ii) Write the changes the parasite undergoes in the liver.

(iii) Write the changes the parasite undergoes when it enters the RBC.

(iv) (a) Trace the changes the parasite undergoes when the host 'X' takes its blood meal from infected host 'Y.

OR

(iv) (b) At which stage during the life cycle of the pathogen does the host 'Y' experience the symptoms of the disease? Name the disease and the toxic substance responsible for these symptoms.
(2023)

7.2 Immunity

Innate Immunity

VSA (1 mark)

21. State the function of interferons.
(AI 2019)

OR

How do cytokine barriers help in evading viral infections?

(NCERT Exemplar, Delhi 2015C)

22. How do cytokine barriers provide innate immunity in humans?
(2018)

23. In what way is monocyte a cellular barrier with reference to immunity?
(Delhi 2015 C)

24. Name any two types of cells that act as cellular barriers to provide innate immunity in humans.

(Delhi 2014)

Acquired Immunity

MCQ

25. Select the options which is/are incorrect statement(s) with respect to T-lymphocytes in the human body.

(i) They are a type of white blood cells.

(ii) They are produced in bone marrow.

(iii) They remain active at all times in the body.

(iv) They mature in the bone marrow.

(a) (i) and (iv) only
(c) (iv) only
(b) (iii) only
(d) (iii) and (iv) only
(2023)

26. The decrease in the T-lymphocytes count in human blood will result in

(a) decrease in antigens
(b) decrease in antibodies
(c) increase in antibodies
(d) increase in antigens.
(2023)

VSA (1 mark)

27. Suggest a method to ensure an anamnestic response in humans.
(Delhi 2017)

28. Why is secondary immune response more intense than the primary immune response in humans?
(Al 2014)

SA I (2 marks)

29. Name the types of acquired immune responses and the special types of lymphocytes involved in providing them.
(2020)

30. Differentiate between the roles of B-lymphocytes and T-lymphocytes in generating immune responses.
(Delhi 2019)

SA II (3 marks)

31. (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.
(AI 2016)

32. What is the functional difference between B-cells and T-cells?
(Delhi 2015C)

Active and Passive Immunity

MCQ

33. Assertion: Breast-feeding is advised by the doctor as it is essential for the new borns.

Reason: Colostrum secreted by the mother during initial days of lactation has abundant antibodies containing IgE and IgG.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true and R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.
(2023)

VSA (1 mark)

34. Why is colostrum a boon to the newborn baby?
(AI 2015C)

SA I (2 marks)

35. Name the type of immunity the mother provides the new born baby. How does it happen?

(NCERT Exemplar, 2020)

36. Differentiate between active and passive immunity. **(NCERT Exemplar, Al 2014C)**

SA II (3 marks)

37. Mention the chemical nature of an antibody and name the type of cells they are produced by. Write the differences between active and passive immune responses on the basis of antibodies.

(2020)

38. (a) Name and explain giving reasons, the type of immunity provided to the newborn by the colostrum and vaccinations.

(b) Name the type of antibody:

(i) present in colostrum

(ii) produced in response to allergens in human body.
(Foreign 2014)

Vaccination and Immunisation

MCQ

39. The principle of vaccination is based on the property of

(a) specificity

(b) diversity

(c) memory

(d) discrimination between self and non-self.
(2020)

SA I (2 marks)

40. Explain, giving two reasons, how immune response by "vaccine" is different from that by "antitoxin in humans.
(Term II, 2021-22)

41. It is often observed that the chances of a person suffering from measles in his or her lifetime are low if he or she has suffered from the disease in their early childhood. Justify the statement. **(2020)**

42. Principle of vaccination is based on the property of "memory" of the immune system. Taking one suitable example, justify the statement.
(NCERT Exemplar, Delhi 2019)

SA II (3 marks)

43. Following a road accident four injured persons were brought to a nearby clinic. The doctor immediately injected them with tetanus antitoxin.

(a) What is tetanus antitoxin?

(b) Why were the injured immediately injected with this antitoxin?

(c) Name the kind of immunity this injection provide.
(2020)

44. A heavily bleeding and 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.

(AI 2015)

LA (5 marks)

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

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

(b) With the help of an example each, differentiate between active and passive immunity.

(Foreign 2015)

Allergies

VSA (1 mark)

46. State the functions of mast cells in allergy response.

(Term II, 2021-22, AI 2019)

SAI (2 marks)

47. A boy developed some allergic reactions when he straight entered into his air-conditioned room after a game of football outside his house. Write any two symptoms that could be noticed in such condition. How does our body combat such conditions? **(Term II, 2021-22)**

48. Mention one application for each of the following:

(a) Passive immunisation

(b) Antihistamine

(c) Colostrum

(d) Cytokinin-barrier
(AI 2017)

49. Name an allergen and write the response of the human body when exposed to it. **(Delhi 2014C)**

SA II (3 marks)

50. Many people experience allergic symptoms of sneezing or wheezing on exposure to certain substances in the environment. Give two examples of such substances. Which type of antibodies are produced by the body in response to these substances? Mention the role of mast cells in this kind of allergic response.
(Term II, 2021-22)

VSA (1 mark)

Auto Immunity

51. What is an auto-immune disease? Give an example.
(Foreign 2014)

Immune System in the Body

SA I (2 marks)

52. Name the two primary lymphoid organs. State the importance of T-lymphocytes. **(2020)**

53. Write the functions of bone marrow as the primary lymphoid organ and lymph nodes as the secondary lymphoid organs.
(2019C)

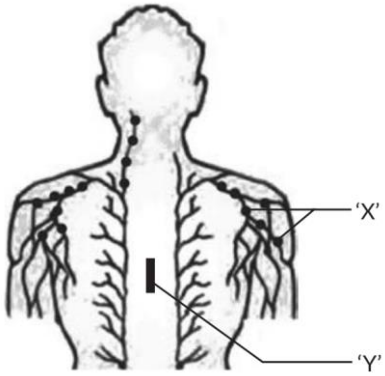
54. State the role of thymus as a lymphoid organ. Name the cells that are released from it and mention their function.
(AI 2019)

SA II (3 marks)

55. (a) Explain the roles of (i) primary, and (ii) secondary lymphoid organs that are responsible for developing defence to combat the action of pathogens/foreign antigens which enter our body.

(b) Doctors generally advise not to undergo surgery of tonsils. Why?
(Term II, 2021-22)

56. Given below is a diagrammatic representation of immune system of the human body:



(a) Identify 'X' and 'Y' in given diagram.

(b) Explain two major functions of the organs that you have identified.
(Term II, 2021-22 C)

LA (5 marks)

57. (a) Name and explain any four lymphoid organs present in humans.

(b) Categorise the named lymphoid organs as primary or secondary lymphoid organs, giving reasons.

(Foreign 2014)

7.3 AIDS

VSA (1 mark)

58. Retroviruses have no DNA. However, the DNA of the infected host cell does possess viral DNA. How is it possible?
(AI 2015)

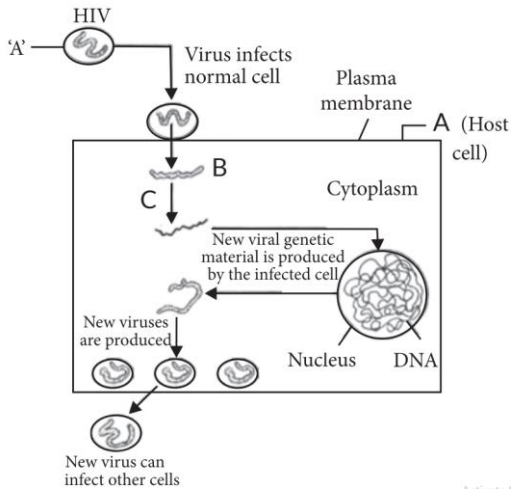
SA II (3 marks)

59. An HIV patient normally doesn't die of 'AIDS', but death is caused due to many other infections. Do you agree with the statement? Give explanatory reasons in support of your answer.

(Term II, 2021-22)

60. Name the cells that acts as HIV factory in humans who infected by HIV. Explain the events that occur in these infected cells.
(2020)

61. Study the diagram showing the entry of HIV into the human body and the process that are followed:



(a) Name the human cells 'A', HIV enters into.

(b) Mention the genetic material B HIV releases into the cell.

(c) Identify enzyme 'C'.
(2020)

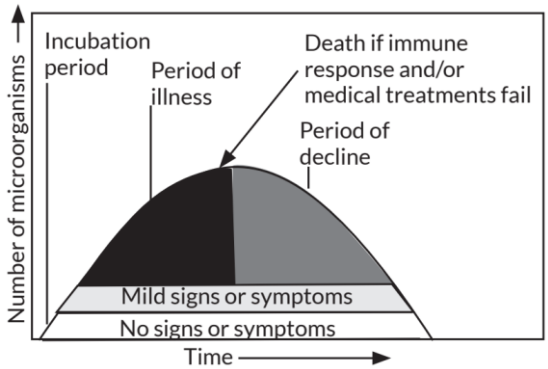
62. (a) What precaution(s) would you recommend to a patient requiring repeated blood transfusion?

(b) If the advice 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. **(Delhi 2017)**

63. How does the HIV breakdown the immune system of the AIDS patient?
(NCERT, Delhi 2015C)

LA (4 marks)

64. When a microorganism invades a host, a definite sequence of events usually occur leading to infection and disease, causing suffering to the host. This process is called pathogenesis. Once a microorganism overcomes the defense system of the host, development of the disease follows a certain sequence of events as shown in the graph. Study the graph given below for the sequence of events leading to appearance of a disease and answer the questions that follow:



(a) In which period, according to the graph there are maximum chances of a person transmitting a disease/infection and why?

(b) Study the graph and write what is an incubation period. Name a sexually transmitted disease that can be easily transmitted during this period.

Name the specific type of lymphocytes that are attacked by the pathogen of this disease.

OR

(b) Draw a schematic labelled diagram of an antibody.

(c) In which period, the number of immune cells forming antibodies will be the highest in a person suffering from pneumonia?

Name the immune cells that produce antibodies.
(2023)

7.4 Cancer

VSA (1 mark)

65. Indiscriminate diagnostic practices using X-rays, etc., should be avoided. Give one reason.

(Delhi 2015)

SA I (2 marks)

66. Why a malignant tumour considered to be more damaging than a benign tumour? Explain.

(2023)

67. How are malignant tumors different from benign tumors ? Why are some patients treated with α - interferon?
(2020)

68. Differentiate between benign and malignant tumors. **(NCERT Exemplar, Al 2015C)**

SA II (3 marks)

69. (a) Explain the property of contact inhibition and its effect on normal human cells and cancerous cells.

(b) Why are biological modifiers like α-interferon required for cancer treatment? How do they act to treat the diseases?
(Term-II, 2021-22)

LA (5 marks)

70. (a) How do normal cells become cancerous?

(b) Cancer can be treated successfully only if detected at an early stage. How do the following help in detecting cancer?

(i) Biopsy, (ii) Histopathology, (iii) MRI

(c) Name any two methods that can possibly cure cancer.
(NCERT Exemplar, 2020)

71. (a) Cancer is one of the most dreaded disease. Explain 'contact inhibition' and 'metastasis' with respect to the disease.

(b) Name the group of genes that have been identified in normal cells that could lead to cancer. How do these genes cause cancer?

(c) Name any two techniques that are useful in detecting cancers of internal organs.

(d) Why are cancer patients often given α-interferon as part of the treatment?
(Delhi 2014)

7.5 Drugs and Alcohol Abuse

MCQ

72. Opioids act as

(a) depressants (b) painkillers

(c) euphoria providers (d) stimulants.
(2020)

SA I (2 marks)

73. (i) Write the scientific name of the plant from where natural cannabinoids are obtained.

(ii) Mention the parts of the plant that are used for extracting the drug.

(iii) How does the drug affect human body?
(Term-11, 2021-22)

74. State the mode of action of cocaine on human body. Write the scientific name of the source plant it is obtained from.
(Term II, 2021-22)

75. Enumerate four most common warning signs of drug and alcohol abuse amongst the youth.

(Term II, 2021-22)

76. (a) Name the source plant of heroin drug. How is it obtained from the plant?

(b) Write the effects of heroin on the human body.
(2018)

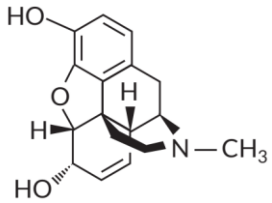
77. What is 'withdrawal syndrome'? List any two symptoms it is characterised by.

(NCERT Exemplar, Foreign 2014)

78. Write the scientific name of the source plant of the drugs, marijuana and hashish and mention their effect on the human body.
(Delhi 2014C)

SA II (3 marks)

79.



(a) Name the category of drugs represented by the chemical structure given above.

(b) If the methyl group is substituted by acetyl group we get a bitter crystalline compound. Name the compound.

(c) Name the natural source of these compounds.

(d) State the harmful effects of this class of drugs on the human body.
(2023)

80. Answer the following questions with reference to "opioids", the commonly abused drug:

(a) Where in our body are the specific opioid receptors present?

(b) What is heroin chemically known as ?

(c) Write the scientific name of the plant from which opioids are extracted.
(2021 C)

81. (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 drug/alcohol abuse in youth.

(NCERT Exemplar, Al 2017)

82. 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 generic names of two plants from which these drugs are obtained.
(Delhi 2016)

83. A team of students is preparing to participate in the interschool sports meet. During a practice session you find some vials with labels of certain cannabinoids.

(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.
(Delhi 2015)

84. Do you support 'Dope' test being conducted on sportspersons participating in a prestigious athletic meet? Give three reasons in support of your answer.
(Al 2014C)

CBSE Sample Questions

7.1 Common Diseases in Humans

SA II (3 marks)

1. (a) Explain the life cycle of Plasmodium starting from its entry in the body of female Anopheles till the completion of its life cycle in humans.

(b) Explain the cause of periodic recurrence of chill and high fever during malarial attack in humans. **(2022-23)**

2. A person is suffering from a high-grade fever. Which symptoms will help to identify if he/she is suffering from typhoid, pneumonia or malaria?

(Term II, 2021-22)

7.2 Immunity

Innate Immunity

MCQ

3. Interferons are most effective in making non-infected cells resistant against the spread of which of the following diseases in humans?

(a) Ascariasis (b) Ringworm

(c) Amoebiasis (d) AIDS **(2022-23)**

SA I (2 marks)

4. Humans have innate immunity for protection against pathogens that may enter the gut along with food. What are the two barriers that protect the body from such pathogens? **(Term II, 2021-22)**

Acquired Immunity

SA II (3 marks)

5. Highlight the structural importance of an antibody molecule with a diagram. Name the four types of antibodies found to give a humoral immune response, mentioning the functions of two of them you have studied. **(2022-23)**

6. Recognition of an antigenic protein of a pathogen or exposure to a pathogen occurs during many types of immune responses, including active immunity and induced active immunity. Specify the types of responses elicited when human beings get encountered by a pathogen. **(Term II, 2021-22)**

7.3 AIDS

LA (5 marks)

7. A patient had tested positive to ELISA Test. Identify the disease and the pathogen responsible, give reasons for the reduced/weak immunity of the patient and trace the path, spread and effects of this pathogen in the human body.

(2020-21)

7.4 Cancer

SA II (3 marks)

8. How do normal cells get transformed into cancerous neoplastic cells? Elaborate giving three examples of inducing agent. **(Term II, 2021-22)**

LA (5 marks)

9. Identify and name the disease in which the patient's cells lose the property of contact inhibition. State its possible causes and explain any three methods to accurately detect the pathological and physiological changes that take place due to the disease in living tissues. **(2020-21)**

10. (a) If a patient is advised anti-retroviral drug, name the possible infection he/she is likely to be suffering from. Name the causative organism.

(b) How do vaccines prevent subsequent microbial infection by the same pathogen?

(c) How does a cancerous cell differ from a normal cell?

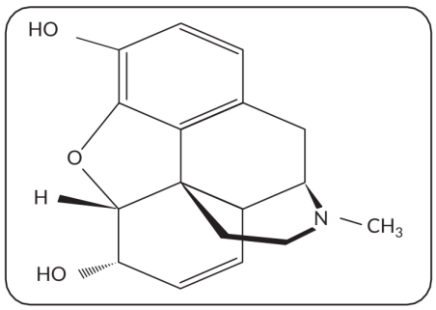
(d) Many microbial pathogens enter the gut of humans along with food. Name the physiological barrier that protects the body from such pathogens. **(2020-21)**

7.5 Drugs and Alcohol Abuse

Adolescence and Drug Abuse

SA I (2 marks)

11. Identify the chemical structure of compound shown below. State any three of its physical properties.



(Term II, 2021-22)

Detailed SOLUTIONS

Previous Years' CBSE Board Questions

1. (d): Haemophilus influenzae causes pneumonia. It infects the alveoli of the lungs. As a result of the infection, alveoli get filled with fluid leading to difficulty in respiration.

2. (b)

3. Chikungunya and dengue can be controlled by the eradication of Aedes mosquitoes.

4. Snail and fish

5. Gambusia is a larvivorous fish. It feeds on mosquito larvae, so introduced in drains and ponds to check spread of mosquito borne diseases.

6. Haemozoin is a toxic substance released by rupturing of RBCs into blood during malarial infection. It causes chill and high fever recurring every 3-4 days.

7. The two genera of fungi which causes ringworm are Microsporum and Trichophyton.

Two symptoms of ringworm are:

(i) Appearance of dry, scaly lesions on various parts of the body such as skin, nails and scalp.

(ii) These lesions are accompanied by intense itching.

8. Influenza (flu) caused by Orthomyxovirus is an air borne disease. It is caused by droplet infection. Person suffering from influenza experiences headache and fever.

Typhoid caused by bacterium Salmonella typhi is a water borne disease. It is transmitted through faecal oral route. Patient suffering from typhoid has high fever and feels abdominal pain.

9. (i) Malaria is a protozoan disease caused by Plasmodium.

(ii) Elephantiasis or filariasis is a helminthic disease caused by Wuchereria.

10. Ascariasis is caused by the common roundworm Ascaris lumbricoides, a giant intestinal worm. Symptoms of this disease include internal bleeding, muscular pain, fever, anemia and blockage of the intestinal passage. A healthy person acquires infection through contaminated water, vegetables, fruits, etc.

11. Malaria is a fatal disease of human beings caused by a protozoan parasite, Plasmodium. It is digenetic; i.e., it requires two hosts to complete its life cycle:

mosquito (Anopheles) is primary or definitive host in which sexual stage of the parasite occurs whereas human being is intermediate or secondary host in which the asexual phase of malarial parasite occurs.

(i) Plasmodium enters the human body as sporozoites through the bite of infected female Anopheles mosquito.

(ii) The sporozoites reach the liver through blood where, they reproduce asexually and attack the red blood cells (RBCs) resulting in their rupture.

(iii) The rupture of RBCs is associated with the release of a toxin known as haemozoin, which is responsible for the high recurring fever and chill/shivering recurring every 3/4 days.

(iv) Gametocytes (sexual stages) develop in the RBCs of female Anopheles.

(v) The female parasite then enters the mosquito's body along with the blood when it bites the infected person.

(vi) Further development occurs in stomach wall of mosquito and gamete fuse to form a zygote.

(vii) Thus, the zygote undergoes further development in the body of the mosquito to form sporozoites.

(viii) These sporozoites are then transported and stored in salivary glands of mosquito and are transferred into a human body during the bite of the mosquito.

12. Six ways of achieving good health are:

(i) Take balanced diet

(ii) Maintain personal hygiene

(iii) Do regular exercise

(iv) Practise yoga to achieve physical and mental health.

(v) Awareness about diseases and their effect on different body functions

(vi) Proper disposal of wastes

13. In ascariasis, the patient feels colic pain and may suffer from indigestion, diarrhoea and vomiting. In amoebiasis (amoebic dysentry), the patient passes blood alongwith the faeces and feels pain in the abdomen. Elephantiasis is characterised by abnormal swelling of the legs or other body parts.

14. (a) Pneumonia is caused by bacterium Streptococcus pneumoniae and Haemophilus influenzae whereas common cold is caused by rhino viruses.

(b) Pneumonia in humans infects the alveoli (air filled sacs) of the lungs, due to which the alveoli get filled with fluid leading to severe problems in respiration whereas in common cold, nose and respiratory passage gets infected but not the lungs.

(c) Cough and headache are the common symptoms to both pneumonia and common cold.

15. Amoebiasis is caused due to protozoan parasite Entamoeba histolytica. The symptoms of this disease are constipation, abdominal pain, cramps, stools with excess mucous and blood clots. It is transmitted through faecal oral route. Drinking water and food contaminated by the faecal matter are the main sources of infection. Houseflies act as mechanical carriers and serve to transmit the parasite from faeces of infected person to food and food products, thereby contaminating them.

16. (a) When RBCs infected with malarial parasites burst, they release toxin called haemozoin which causes chill and high fever recurring every three or four days.

(b) (i) Production of sporozoites occurs in female Anopheles mosquito, inside oocyst on the surface of stomach.

(ii) Gametocytes formation takes place in human host inside RBCs.

17. Roundworms are nematodes, responsible for helminthic diseases in humans.

Two human diseases caused by roundworms are:

(i) Ascariasis - It is caused by Ascaris lumbricoides and spreads through contaminated fruits, water, vegetables, etc.

(ii) Filariasis - It is caused by Wuchereria bancrofti and W. malayi. It is transmitted through the bite of female Culex mosquito.

18. Female Anopheles mosquito picks up Plasmodium as gametocytes with blood meal. Life cycle of Plasmodium in mosquito is as follows:

The gametocytes come out of the RBCs into the lumen of the stomach of the mosquito. Inside the stomach of the mosquito, the male and female gametocytes change into male and female gametes respectively. The gametes fuse (fertilise) to form zygote called oocyst. The nucleus of oocyst divides first by meiosis and subsequently by mitosis, forming large number of small haploid nuclei. At the same time, spindle shaped bodies called sporozoites are formed. When mature oocysts rupture, the sporozoites are liberated into the haemocoel (body cavity filled with blood) of the mosquito. Being motile, the sporozoites move to different organs in the body cavity of the mosquito, but many of them penetrate the salivary glands. The mosquito now becomes infective. When the female

Anopheles mosquito bites a healthy person, the sporozoites are injected in his/her blood along with saliva. These sporozoites start the cycle again in human body.

19. (a) (i) Elephantiasis - Wuchereria bancrofti

(ii) Ringworm - Microsporum

(iii) Amoebiasis - Entamoeba histolytica

(b) Maintenance of public hygiene is very important for prevention and control of many infectious diseases. Public hygiene includes proper disposal of waste and excreta, periodic cleaning and disinfection of water reservoirs, pools and tanks and observing standard practices of hygiene in public catering. These measures are particularly essential where the infectious agents are transmitted through food and water such as typhoid, amoebiasis and ascariasis.

20. (i) The diagram shows life cycle of Plasmodium. Plasmodium enters the human body (Y) as sporozoites through the bite of infected female Anopheles mosquito (X).

(ii) The parasite reproduces asexually in liver cells, bursting the cell and releasing into the blood.

(iii) Parasites reproduce asexually in red blood cells thereby bursting the RBCs and causing cycles of fever, chills and other symptoms. Released parasites infect new red blood cells.

(iv) (a) When a female Anopheles mosquito (X) bites an infected person (Y), these parasites enter the mosquito's body as gametocytes where they undergo fertilisation and further development. The parasites multiply within them to form sporozoites that are stored in salivary glands of mosquito.

OR

(iv) (b) Humans (Y) experience the symptoms of disease when parasite ruptures the red blood cells causing chills and fever. The disease is malaria. The rupture of RBCs is associated with release of a toxic substance, haemozoin, which is responsible for the chill and high fever recurring every three to four days.

21. Interferons are cytokine barriers. These are low molecular weight proteins secreted by virus infected cells, which protect non-infected cells from further viral infection.

22. Certain cells when infected with virus, produce cytokines such as interferons, which diffuse to healthy neighbouring cells and stimulates them to produce biochemicals, that block viral replication. When these cells become infected, the viruses are unable to take over the protein synthetic machinery to manufacture

more of themselves and ultimately the spread of infection halts. This way cytokine barriers provide innate immunity in humans.

23. Monocytes are motile and phagocytic leucocytes. They engulf bacteria and cellular debris and constitute cellular barriers of innate immunity.

24. Certain types of leukocytes (WBCs) like polymorphonuclear leukocytes (PMNL-neutrophils) and natural killer cells (type of lymphocytes) in the blood are cellular barriers, which provide innate immunity in humans.

25. (b): T-lymphocytes become active at time of antigenic stimulation.

26. (b): Antibodies are immunoglobulins produced by B-lymphocytes of immune system in response to foreign proteins, called antigens. T-lymphocytes do not secrete antibodies themselves but help B-lymphocytes to produce them. So, the decrease in T-lymphocytes count results into the decrease in antibodies.

27. To ensure anamnestic or secondary immune response, dead or attenuated pathogens of a disease are injected into a healthy person that can produce memory cells, i.e., vaccination. Antibodies produced against these antigens would neutralise pathogens during actual infections.

28. Secondary immune response is quicker and more intense than the primary immune response because the memory B cells are present to quickly deal with the invading microbes by forming antibodies. Body "remembers" that it previously encountered this type of infection.

29. Acquired immune responses are of two types i.e., antibody mediated or humoral immune response and cell mediated immune response. In former, B-lymphocytes and in later T-lymphocytes provides immune responses.

30. Differences between the role of B-lymphocytes (B-cells) and T-lymphocytes (T-cells) in generating immune responses are:

	B-lymphocytes (B-cells)	T-lymphocytes (T-cells)
(i)	B-cells form humoral or antibody mediated immune system(AMIS).	T-cells form cell-mediated immune system (CMIS).
(ii)	They defend against viruses and bacteria that enter the blood and lymph.	They defend against pathogens including protists and fungi that enter the cells.
(iii)	Plasma cells formed by division of B-cells produce antibodies and provide immunity against foreign substances.	T-lymphocytes produce different types of T-cells, e.g., killer T-cells react against cancer cells, suppressor cells inhibit immune system.

31. (a) Children who had suffered from chicken-pox may not contract the same disease in their adulthood because of development of memory cells. These types of cells develop during first encounter with the pathogen.

Memory cells are highly specific and may remain in body for decades. Subsequent encounter with the same pathogen elicits a highly intensified secondary or anamnestic response. This type of immunity is known as acquired natural active immunity.

(b) Interferons are the proteins produced by virus infected cells. They protect non-infected cells from further viral infection.

32. Refer to answer 30.

33. (c): Colostrum, the yellowish fluid, secreted by mother during the initial days of lactation is rich in immunoglobulin A(IgA) antibodies.

34. Colostrum (mother's first milk) is rich in IgA antibodies. It provides passive immunity to new born and protects it from various diseases and therefore, this milk is considered very essential for the new born infants.

35. The yellowish fluid colostrum secreted by mother during the initial days of lactation, rich in IgA antibodies. It provides passive immunity to new born and protects it from various diseases and therefore, this milk is considered very essential for the new born infants.

36. The differences between active and passive immunity are:

S.No.	Active immunity	Passive immunity
(i)	It is developed when the person's own cells produce antibodies in response to infection or vaccine.	It is developed when antibodies produced in other organisms are injected into a person to counter act antigen such as snake venom.
(ii)	It provides relief only after long period.	It provides immediate relief.
(iii)	It has no side effects.	It may cause reaction.
(iv)	It is long lasting.	It is not long lasting.

37. Antibodies are immunoglobulins which are produced in the body in response to the antigen or foreign bodies. Antibodies are produced by B-lymphocytes and plasma cells. The differences between active and passive immunity are:

Sr.No.	Active immunity	Passive immunity
(i)	It is developed when the person's own cells produce antibodies in response to infection or vaccine.	It is developed when antibodies produced in other organisms are injected into a person to counter act antigen such as snake venom.
(ii)	It provides relief only after long period.	It provides immediate relief.
(iii)	It has no side effects.	It may cause reaction.
(iv)	It is long lasting.	It is not long lasting.

38. (a) Colostrum (mother's first milk) rich in IgA antibodies provides natural passive immunity to new born. In passive immunity, ready-made antibodies are directly injected into a person to protect the body against foreign agents.

Through vaccination artificial active immunity, will be provided to the newborn in which his own cells will produce antibodies in response to vaccine. E.g., BCG vaccine for tuberculosis.

(b) (i) IgA (ii) IgE

39. (c): The principle of immunisation or vaccination is based on the property of memory of immune system.

40. The immune response by "vaccine" is different from that by "antitoxin" in humans due to the following reasons.

(i) Vaccines are antigenic preparation made out of pathogen, which when introduced into body, causes antibody formation against antigen, whereas antitoxins are preformed antibodies which are injected for quick immune response.

(ii) Vaccines provide active immunity whereas antitoxin provide passive immunity. So, vaccines provide relief only after long period as they are based on the property of 'memory' of the immune system and generates memory B and T cells that recognises the pathogen quickly whereas antitoxin provide immediate relief.

41. This can be explained in terms of memory cells. After the measles disappears as a result of antigen-antibody interaction and killer T-cell-nonself cell interaction, some of the specific lymphocytes remain in lymphatic tissue as "memory or primed cells" which are ready to produce the antibodies and killer cells if the same antigens reappear. That is why the second attack of the measles elicits quick and abundant antibody formation. The memory cells can give rise to more effector cells and memory cells in case of a second attack of antigens whereas the effector cells have a life of a few days only, and the memory cells live long, some even for whole life. The memory cells are stored in the spleen and lymph nodes.

42. The principle of vaccination is based on the property of 'memory' of the immune system. It is because vaccines generate memory-B cells and T-cells that recognise the pathogen quickly.

For example, in case of snake bites the injection which is given to the patients contains preformed antibodies against the snake venom. This type of immunisation is called passive immunisation.

43. (a) Tetanus antitoxin is an antitetanus serum prepared in horses by active immunisation of horses with tetanus toxoid, bleeding them and separating the serum. ATS is used for passive immunisation against tetanus.

(b) Persons injured in a roadside accident with a bleeding wound have chances of getting infected from tetanus. So quick immune response is required, therefore, preformed antibodies, or antitoxin (a preparation containing antibodies to the toxin) is directly injected.

(c) This injection provides passive immunity.

44. (a) Doctor injected tetanus anti-toxin into patient's body.

(b) Injection containing preformed antibodies or antitoxin (preparation containing antibodies to toxin) would neutralise the pathogenic agents and would give quick relief.

(c) Injection was given against tetanus and it provides artificial passive immunity.

45. (a) Vaccine is a suspension or extract of weakened (attenuated/dead) pathogens of disease which when injected into healthy person provides active acquired immunity against the disease.

Vaccination stimulates the antibody production and formation of memory cells without causing the disease. This protects the child by neutralising the pathogenic agents during infection.

In vaccination, a preparation of antigenic proteins of pathogens or weakened pathogen is introduced into the body. These antigens generate the primary immune response and forms memory B and T cells.

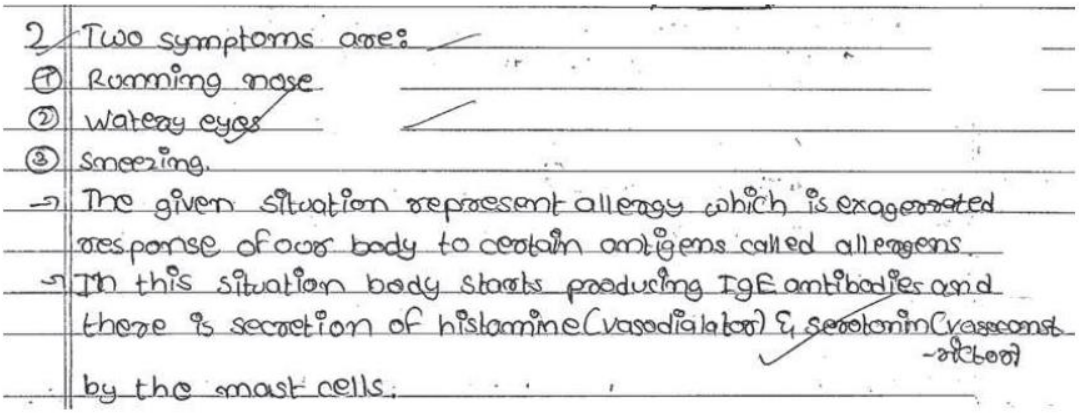
When the vaccinated person is attacked by the same pathogen again, the existing memory T or B cells recognise the antigen quickly and attack the invaders with massive production of lymphocytes and antibodies.

(b) The given table shows differences between active and passive immunity:

	Active immunity	Passive immunity
(i)	It is developed when the person's own cells produce antibodies in response to infection or vaccine.	It is developed when antibodies produced in other organisms are injected into a person to counter act antigen such as snake venom.
(ii)	It provides relief only after long period.	It provides immediate relief.
(iii)	It has no side effects. It is long lasting.	It may cause reaction. It is not long lasting.
(iv)	*E.g.*, MMR vaccine for measles, mumps, rubella.	*E.g.*, Colostrum rich in IgA antibodies provides immunity to newborn.

46. Mast cells are involved in allergic and hypersensitivity reactions. The substances which cause allergic reactions are called allergens. These allergens combine with antibody-bound mast cells and basophils. This complex ruptures the mast cells and basophils releasing histamine that acts as an allergy mediator. Histamine increases permeability of capillaries, constricts smooth muscles, etc., that results into the inflammatory response to protect the body against allergens.

47.


2 Two symptoms are:
① Running nose
② Watery eyes
③ Sneezing.
→ The given situation represent allergy which is exaggerated response of our body to certain antigens called allergens.
→ In this situation body starts producing IgE antibodies and there is secretion of histamine (vasodilator) & serotonin (vasoconstrictor) by the mast cells.

[Topper's Answer, 2022]

48. (a) Passive immunisation refers to the process of injecting preformed antibodies to a person. For example, preformed antibodies are given to a patient of snake bite.

(b) Antihistamine is the drug that is used to reduce the symptoms of allergy.

(c) Colostrum (mother's first milk) is rich in IgA antibodies. It provides passive immunity to new born and protects it from various diseases and therefore, this milk is considered very essential for the new born infants.

(d) Interferons are cytokine barriers. These are low molecular weight proteins secreted by virus infected cells, which protect non-infected cells from further viral infection.

49. Pollen grain is an allergen. Exposure to pollen causes hay fever. It is the form of allergy due to pollen of grasses, trees and other plants. It is characterised by inflammation of the membrane lining the nose and sometimes of the conjunctiva. The symptoms are sneezing, running nose and watering eyes due to histamine release.

50. The two examples of allergens are dust and pollen grains. The antibody IgE is released by the body in response to these substances. The IgE stimulates basophils and mast cells. The mast cells release chemicals like histamine and serotonin. These chemicals cause inflammation in the body which can be controlled by steroids and adrenaline.

51. Autoimmune disease is a condition in which body's immune system attacks self-cells, e.g., rheumatoid arthritis.

52. Two primary lymphoid organs are bone marrow and thymus. T-lymphocytes constitute cell mediated immune system. The two important functions of T-lymphocytes are effector and regulatory. The effector function includes cytolysis (destruction of cells by immune processes) of cells infected with microbes and tumour cells and lymphokine production. The regulatory functions are either to increase or to suppress other lymphocytes and accessory cells.

53. Bone marrow is the main lymphoid organ where all blood cells including lymphocytes are formed. Maturation of B-lymphocytes occurs here. Lymph nodes trap microorganisms or antigens from lymph and tissue fluid. Antigens trapped are responsible for the activation of lymphocytes present there and cause the immune response.

54. Thymus is a primary lymphoid organ where the maturation of T-lymphocytes takes place. Thymus is quite large in size at the time of birth but it atrophies with age. T-lymphocytes are released from thymus. These cells provide cell-mediated immunity and defend against pathogens including protists and fungi that enter the cells.

55. (a) Primary lymphoid organs are sites where immature lymphocytes differentiate into antigen-sensitive lymphocytes. Two primary lymphoid organ are:

(i) Bone morrow - All lymphocytes are produced and mature in bone marrow.

(ii) Thymus - T-lymphocytes are matured in thymus of lymphocytes with antigen, which then proliferate to become effector cells.

Secondary lymphoid organs provide sites for interaction. Spleen and lymph nodes are secondary lymphoid organs.

(i) Spleen acts as filter to blood by trapping blood borne microbes.

(ii) Lymph nodes trap microorganisms or antigens from lymph and tissue fluid. Antigens trapped are responsible for the activation of lymphocytes present there and cause the immune response.

(b) Doctors generally do not advise to undergo surgery of tonsil because they are secondary lymphoid organs. They act as filters to protect the body from antigens and aid in the activation of white blood cells which provides immunity.

56. (a) X is lymph node and Y is thymus.

(b) Lymph nodes (X): These are small solid structures found at intervals along the lymphatic system. They are composed of lymphoid tissue and act as filters for the lymph, preventing foreign particles from entering the bloodstream. Lymph nodes also produce lymphocytes and plasma cells.

Thymus (Y): Thymus is a primary lymphoid organ where T-lymphocytes and B lymphocytes mature and acquire their antigen-specific receptors.

57. (a) Lymphoid organs include bone marrow, thymus, lymph nodes, spleen, Peyer's patches, tonsils, and appendix.

Four lymphoid organs are:

(i) Bone marrow: It is the main lymphoid organ where all blood cells including lymphocytes are formed. Maturation of B-lymphocytes occurs here.

(ii) Thymus : It is the site of T-lymphocyte maturation. Thymus is situated near the heart and is quite large in size at the time of birth but keeps reducing with age.

(iii) Lymph nodes: These are small solid structures found at intervals along the lymphatic system. They are composed of lymphoid tissue and act as filters for the lymph, preventing foreign particles from entering the bloodstream. Lymph nodes also produce lymphocytes and plasma cells.

(iv) Spleen: It is a bean-shaped organ which is the largest single mass of lymphoid tissue in the body. In fetus, the spleen produces all types of blood cells but in adult it only produces lymphocytes. Macrophages of spleen are phagocytic in nature.

(b) There are two types of lymphoid organs : primary lymphoid organs and secondary lymphoid organs. The primary lymphoid organs, e.g., bone marrow and thymus where T-lymphocytes and B-lymphocytes, mature and acquire their antigen-specific receptors. After maturation, the lymphocytes migrate to secondary lymphoid organs, e.g., spleen and lymph nodes where they undergo proliferation and differentiation. The acquired immune response to antigens usually develops in these organs and become effector cells.

58. Retroviruses have RNA as their genome. RNA genome of virus replicates in host cell to form viral DNA with the help of reverse transcriptase enzyme.

59. Yes, I agree with the statement. Death of a HIV patient is caused due to several other infections in the body. After entering the body, HIV virus enters into macrophages, where its RNA genome replicates to form viral DNA with the help of reverse transcriptase enzyme.

This viral DNA is now incorporated into the host cell's DNA and directs the infected cell to produce more viruses. Simultaneously HIV virus enters into helper T-lymphocytes and replicates there. This leads to decrease in the number of T-lymphocytes in body and hence the infected person's immune system gets weakened.

As a result, the infected body is prone to other infections of bacteria, viruses, fungi and even parasites leading to the death of the infected person. The body's immune system becomes so weak that it is unable to fight against the mild infections also.

60. Macrophages act as HIV factory in humans. Events that occur in infected cells are:

(i) After the entrance of the virus into the body of the person, the virus enters into macrophages where RNA genome of the virus replicates to form viral DNA with the help of reverse transcriptase enzyme.

(ii) Viral DNA gets incorporated into the host cell's DNA and directs the infected cells to produce viruses.

(iii) Simultaneously, HIV virus enters into helper T-lymphocytes where it replicates and produces more viruses. This is repeated so that the number of helper T-lymphocytes decreases in the body of the infected person.

(iv) Due to decrease in the number of helper T-lymphocytes in the body, the person starts suffering from infections and gets immune deficiency and he/she is unable to protect himself/herself against these infections.

61. (a) HIV enters into macrophages (A).

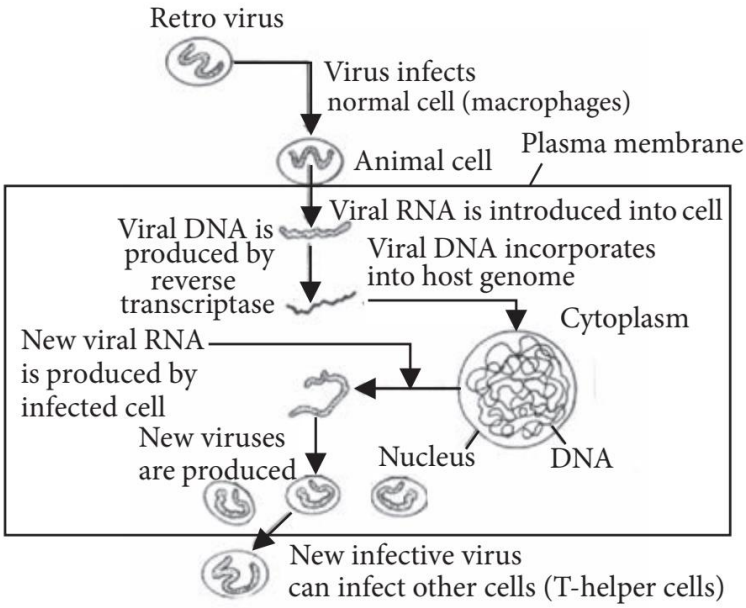
(b) B is viral RNA.

(c) Enzyme C is reverse transcriptase.

62. (a) If a patient requires repeated blood transfusion, it should be ensured that donor's blood has been screened for HIV and the syringes used should be new and disposable.

(b) If the patient does not follow these precautions, then he/she might be infected with HIV which causes AIDS (Acquired Immuno Deficiency Syndrome).

AIDS is a disorder of cell mediated immune system of the body. There is a reduction in the number of helper T-cells which stimulate antibody production by B-cells. This results in the loss of natural defence of the body against viral infection.



Thus, the immune system gets hampered due to the action of AIDS virus on T-lymphocytes and macrophages.

63. Refer to answer 60.

64. (a) According to graph, during period of illness, there are maximum chances of a person to transmit a disease because, during period of illness number of microorganisms are high and the signs and symptoms of disease are most obvious, specific and severe.

Though, infectious diseases can be contagious during any period of disease as which periods of disease are more likely to associated with transmissibility of an infection depends upon the nature of the disease, the pathogen, and the mechanisms by which this disease develops and progresses.

For example, in meningitis (infection of the lining of brain), the period of infectivity depends on the type of pathogen causing the infection.

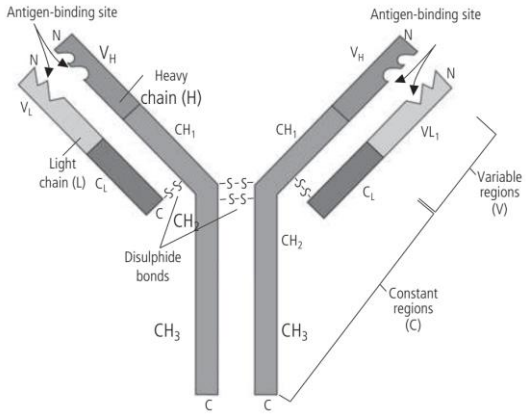
(b) The incubation period is the time it takes for an infection to develop after a person has been exposed to a disease-causing organism (such as bacteria, viruses, or fungi). During this time the pathogen begins multiplying in the host. However, there are insufficient number of pathogen particles (cells or viruses) present to cause signs and symptoms of disease.

Incubation period can vary from a day or two in acute disease to months or years in chronic disease, depending upon the pathogen. AIDS is a sexually transmitted

disease that can be easily transmitted during incubation period. Human Immunodeficiency Virus (HIV), the pathogen of AIDS attack T-lymphocytes.

OR

(b) The schematic labelled diagram of an antibody is as follows:



(c) During period of decline, the number of immune cells forming antibodies will be the highest in a person suffering from pneumonia.

The B-lymphocytes produce proteins called antibodies in response to pathogens into our blood to fight with them.

65. Indiscriminate use of X-rays can cause DNA damage leading to neoplastic transformation.

66. Malignant tumor is cancerous in which a mass of proliferating cells grows very rapidly, invading and damaging the surrounding normal cells. Cells from such tumors when reach distant sites through blood, they get lodged and start a new tumor there whereas benign tumor is non-cancerous normally remains confined to their original location and do not spread to other parts of the body, and cause little damage. Thus, malignant tumor is considered to be more damaging than a benign tumor.

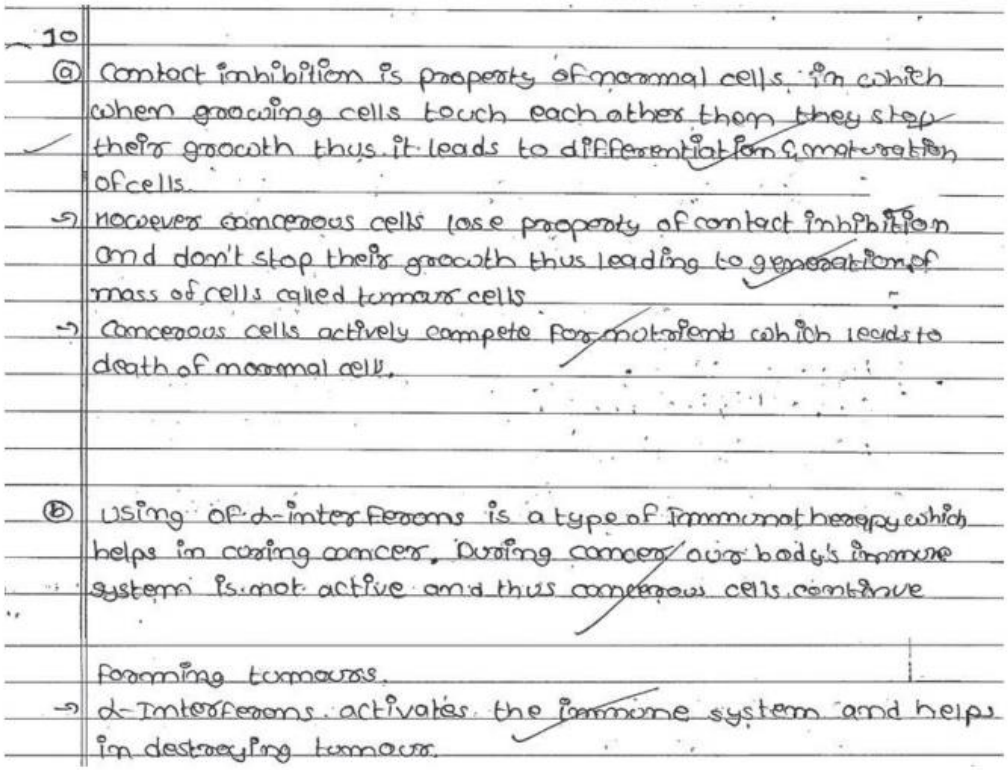
67. Differences between benign tumor and malignant tumor are as follows:

	Benign tumor	Malignant tumor
(i)	It remains confined to the affected organ.	It spreads to other organs of the body.
(ii)	Rate of growth is usually slow.	Rate of growth is usually rapid.
(iii)	It causes limited damage to the body.	The cancer cells migrate to other sites of the body and start a new tumor there. This property is called metastasis.
(iv)	It is non-cancerous.	It is cancerous.

Some patients are treated with D-interferon as these are biological response modifiers which activate their immune system and help in destroying the tumor.

68. Refer to answer 67.

69.



10

(a) Contact inhibition is property of normal cells in which when growing cells touch each other then they stop their growth thus it leads to differentiation & maturation of cells.

→ However cancerous cells lose property of contact inhibition and don't stop their growth thus leading to generation of mass of cells called tumour cells.

→ Cancerous cells actively compete for nutrients which leads to death of normal cell.

(b) Using of α-interferons is a type of Immunotherapy which helps in curing cancer. During cancer our body's immune system is not active and thus cancerous cells continue forming tumours.

→ α-Interferons activates the immune system and helps in destroying tumour.

[Topper's Answer, 2022]

70. (a) Several genes called cellular oncogenes (c-onc) or proto-oncogenes have been identified in normal cells which, when activated under certain conditions, could lead to oncogenic transformation of the cells (cancer).

(b) (i) Biopsy is a procedure wherein a sample of tissue is taken from the body in order to examine it more closely in a laboratory for presence of any malignancy.

(ii) Histopathology is the diagnosis and study of diseases of the tissues and involves examining of the tissues and/or cells under a microscope. It helps in diagnosis of abnormal growth in cells of a tissue.

(iii) MRI or magnetic resonance imaging is very helpful to detect cancer of the internal organs. It is a medical imaging technique used in radiology to form pictures of anatomy and the physiological processes of the body. MRI scanners use strong magnetic fields and radio waves to generate images of the organs of the body.

(c) Radiotherapy and chemotherapy can possibly cure cancer in some patients to an extent.

71. (a) The normal cells are characterised by contact inhibition by virtue of which contact with other cells inhibits their uncontrolled growth. Metastasis is a property shown by cancerous cells in which these cells detach from the tumors and move to distant sites through body fluids and develop secondary tumors. Metastasis is fatal because the cancerous cells damage other normal cells, compete with them for vital nutrients and disrupt the normal metabolism.

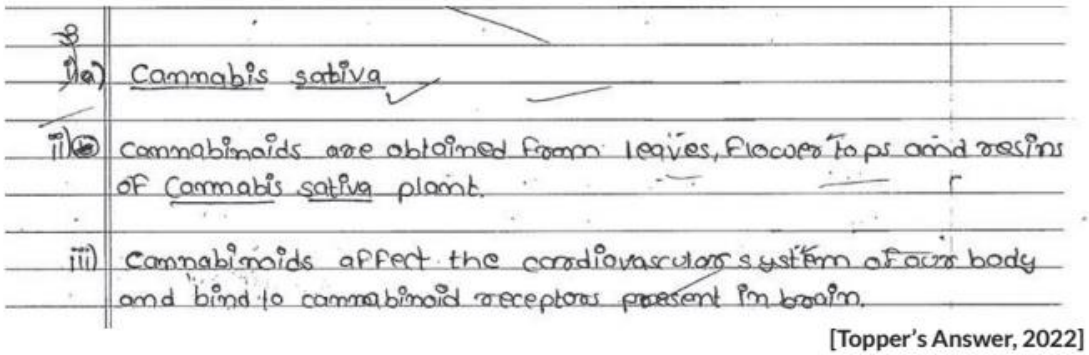
(b) Several genes called cellular oncogenes (c-onc) or proto-oncogenes have been identified in normal cells which, when activated under certain conditions, could lead to oncogenic transformation of the cells (cancer).

(c) Radiography (X-rays) and CT (computerised tomography) are useful in detecting cancer of internal organs.

(d) The cancer patients are given substances called biological response modifiers such as a-interferon which activate their immune system and helps in destroying the tumor.

72. (b): Opioids are drugs derived from opium along with their synthetic relatives are called opioids. They bind to specific opioid receptors present in our central nervous system and gastrointestinal tract and are also called analgesics or pain killers.

73.



[Topper's Answer, 2022]

74. (a) Cocaine, or coca alkaloid interferes with the transport of the neurotransmitter dopamine. It has a potent stimulating action on central nervous system, producing a sense of euphoria and increased energy. Excessive dosage causes hallucinations. It is obtained from coca plant, Erythroxylum coca.

75. The most common warning signs of drug and alcohol abuse amongst the youth are:

(i) Drop in academic performance.

(ii) Unexplained absence from school/college.

(iii) Lack of interest in personal hygiene.

(iv) Withdrawal, isolation, depression, etc.

76. (a) Heroin is obtained from the poppy plant (Papaver somniferum). It is obtained by acetylation of morphine which is extracted from the latex of poppy plant.

(b) Some of the effects of heroin on the human body are as follows:

(i) It is a depressant and slows down body functions. It also induces drowsiness and lethargy.

(ii) Other effects include indigestion, reduced vision, decreased weight, sterility and total loss of interest in work.

77. Withdrawal syndrome is group of symptoms that occur in drug and alcohol addicted individuals who abruptly discontinue or reduce the use of drug of their choice. Withdrawal symptoms include anxiety and nausea.

78. Drugs, marijuana and hashish are obtained from Cannabis sativa. Being hallucinogenic, they give feeling of well-being and happiness. Sometimes, marijuana causes uncontrolled laughter and dilation of pupil.

79. (a) The given chemical structure is of morphine, a opioid narcotics that comes under the category of psychotropic drugs.

(b) Heroin, commonly called as smack is obtained by acetylation of morphine.

(c) This compound is extracted from the latex of poppy plant Papaver somniferum.

(d) Opioids act as depressant and slows down body functions.

80. (a) Specific opioid receptors are present in our central nervous system and gastrointestinal tract.

(b) Heroin, commonly called smack is chemically diacetylmorphine.

(c) Heroin is extracted from latex of poppy plant Papaver somniferum.

81. (a) Guardians fear that their adolescent wards may get trapped in drug/alcohol abuse because it has been observed that use of drugs has increased especially among youth. Adolescence (age group 12-18 years) is the period which is accompanied by several biological and behavioural changes. This is also a very vulnerable phase of mental and psychological development of an individual. Curiosity, need for adventure and excitement, experimentation and exposure to media are some common causes that motivate the youngsters towards drug and alcohol abuse. Of late, stress (to excel in academics or examination) has played major role in persuading youngsters to try alcohol and drugs.

(b) The prolonged use of drugs/alcohol may lead to the dependence of body upon them. Addiction is the habitual, physiological and psychological dependence on substance or practice which is beyond voluntary control. It manifests as a compulsion that drives an individual to continue to behave in a way that is harmful to self and loved ones, despite an intense desire to halt that behaviour. Medically, addiction is of three types: tobacco addiction, alcohol addiction and drug addiction.

Dependence is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if regular dose of drug or alcohol is abruptly discontinued.

82. (a) It is necessary to conduct such tests on sportspersons because they take various drugs like cocaine/coca alkaloids and cannabinoids to increase their muscle tone and performance in sports.

(b) Cocaine/coca alkaloids and cannabinoids.

(c) Cannabinoids are obtained from Cannabis sativa and cocaine is obtained from Erythroxylum coca.

83. (a) Yes, I will report to authorities because cannabinoids are drugs and drug abuse is an illegal practice.

(b) Cannabis sativa

(c) Cannabinoids alter thoughts, feelings and perceptions. These drugs cause illusions.

84. Yes, Dope test should be conducted on sportspersons participating in athletic meet because:

(i) Athletes intake cannabinoids to increase their muscle tone and to have better performance.

(ii) Intake of cocaine alters cardiovascular functions, increases heartbeat and blood pressure.

(iii) Cocaine delays fatigue and helps to enhance performance.

CBSE Sample Questions

1. (a) When a female Anopheles mosquito bites an infected person, the parasites enter the mosquito's body as gametocytes. It leads to fertilisation and development in the gut of the mosquito and undergoes further development to form sporozoites that are stored in salivary glands until their transfer to human body. When mosquito bites another human, sporozoites are injected with bite. In the human body, the sporozoites reach the liver and reproduce asexually, bursting the cells and releasing them into the blood. Parasites reproduce asexually in RBCs, bursting the cell and causing cycles of fever. Released parasites infect new RBCs and develop sexual stage called gametocytes.

(b) The rupture of RBCs releases a toxic substance called haemozoin, which is responsible for the chill and high fever recurring every 3-4 days.

2. If the person has sustained high fever (39°C to 40°C), weakness, stomach pain, constipation, headache and loss of appetite, then it is typhoid.

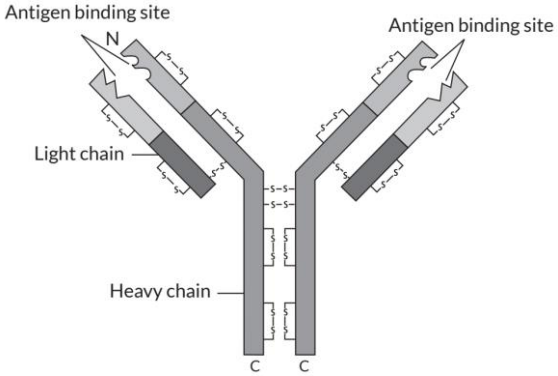
If the person has fever, chills, cough and headache; and the lips and fingernails turn gray to bluish, then it is pneumonia.

If the person has chills and high fever recurring every three to four days then it is malaria.

3. (d): Interferons are protein secreted by virus infected cells to protect non-infected cells from further viral infections (e.g., AIDS caused by HIV).

4. Humans have innate immunity which includes all the defence elements with which an individual is born. When any microbial pathogens enter the gut of humans along with food, various types of barriers prevent the entry of foreign agents. Physical barriers: Mucus coating of the epithelium lining the gastrointestinal tract helps in trapping microbes entering our body. Physiological barriers: Acid in the stomach, saliva in the mouth prevent microbial growth.

5. An antibody molecule consists of four polypeptide chains, two are long heavy (H) chains while other two are short light (L) chains. Both are arranged in the shape of Y. Hence, the antibody is represented as H_2L_2.



Types of Antibody - IgA, IgM, IgE,IgG

IgA-Lactating mother to protect their infant

IgE-To protect from allergen

6. Following are the responses produced by immune system when recognition of an antigenic protein of a pathogen or exposure to a pathogen occurs:

(i) When our body encounters an antigenic protein or a pathogen for the first time, it produces a response which is of low intensity and our body retains memory of the first encounter.

(ii) The subsequent encounter with the same pathogen elicits a highly intensified response carried out with the help of two special types of lymphocytes present in our blood, B-lymphocytes, and T-lymphocytes. The B-lymphocytes produce an army of proteins in response to these pathogens into our blood to fight with them. These proteins are called antibodies. The T-cells themselves do not secrete antibodies but help B-cells to produce them.

7. Disease: AIDS (Acquired Immuno Deficiency Syndrome)

Pathogen: Human Immuno deficiency virus (HIV).

Reason: Due to decrease in the number of helper T-lymphocytes, the person starts suffering from infections that could have been otherwise overcome such as those due to bacteria especially Mycobacterium, viruses, fungi and even parasites like Toxoplasma.

The path of this pathogen and its spread and effect on the human body are as follows:

- After getting into the body of the person, the virus enters into macrophages where RNA genome of the virus replicates by reverse transcription to form viral DNA with the help of the enzyme reverse transcriptase.

- This viral DNA gets incorporated into host cell's DNA and directs the infected cells to produce virus particles.

- The macrophages continue to produce virus and in this way acts like a HIV factory.

- Simultaneously, HIV enters into helper T-lymphocytes (TH), replicates and produce progeny viruses.

- The progeny viruses released in the blood attack other helper T-lymphocytes. This is repeated leading to a progressive decrease in the number of helper T-lymphocytes in the body of the infected person.

- During this period, the person suffers from bouts of fever, diarrhoea and weight loss.

8. Transformation of normal cells into cancerous neoplastic cells may be induced by following physical, chemical or biological agents causing DNA damage.

- lonising radiations like X-rays and gamma rays.
- Non-ionising radiations like UV.
- Chemical carcinogens present in tobacco smoke.

Cellular oncogenes (c-onc) or proto-oncogenes, when activated under certain conditions cause cancer. Viruses with oncogenes can transform normal cells to cancerous cells.

9. In cancer, patient's cells lose the property of contact inhibition.

It may be induced by physical, chemical or biological agents called carcinogens.

(i) Physical or Environmental lonising radiations like X-rays and gamma rays and non-ionising radiations like UV rays cause DNA damage leading to neoplastic transformation or cancer.

(ii) Chemical: Carcinogenic chemicals such as nicotine in tobacco is major cause of lung cancer.

(iii) Biological: Cancer causing viruses called oncogenic viruses have genes called viral oncogenes that leads to cancer. Furthermore, several genes called cellular oncogenes or proto-oncogenes have been identified in normal cells which, when activated under certain conditions could lead to oncogenic transformation of the cells.

Detection and diagnosis:

(i) Cancer detection is based on biopsy and histopathological studies of the tissue; blood and bone marrow tests for increased cell counts in the case of leukemias. In biopsy, a piece of the suspected tissue cut into thin sections is stained and examined under microscope (histopathological studies) by a pathologist.

(ii) Techniques like radiography (use of X-rays), CT (computed tomography) and MRI (magnetic resonance imaging) are very useful to detect cancers of the internal organs. Computed tomography uses X-rays to generate a three-dimensional image of the internals of an object.

MRI uses strong magnetic fields and non-ionising radiations to accurately detect pathological and physiological changes in the living tissue.

10. (a) The patient is likely to be suffering from AIDS.

AIDS is caused by the Human Immuno deficiency Virus.

(b) Vaccines prevent microbial infections by initiating production of antibodies against these antigens to neutralise the pathogenic agents during later actual infection. It generates memory Band T-cells that recognise the pathogen quickly on subsequent exposure.

(c) Normal cells show a property called contact inhibition by virtue of which contact with other cells inhibits their uncontrolled growth.

Cancer cells appear to have lost this property. These cells grow very rapidly, invading and damaging the surrounding normal tissue.

Cells sloughed from tumors reach distant sites through blood and wherever they get lodged in the body, they start a new tumor there. This property is called metastasis.

(d) Hydrochloric acid in the stomach and saliva in the mouth are physiological barrier that protects the body from pathogens.

11. The given structure represents morphine.

Following are the three physical properties of morphine.

(i) It is white in colour.

(ii) It is odourless compound.

(iii) It is crystalline in nature.