

HUMAN HEALTH AND DISEASE

STUDY-NOTES

- Health is a state of complete physical, mental and social well-being. A good health increases efficiency of people. This increases productivity and brings economic prosperity.
- The health is affected by
 - (i) genetic disorders – deficiencies with which a child is born and deficiencies/defects which the child inherits from parents from birth;
 - (ii) infections and
 - (iii) lifestyle including food and water we take, rest and exercise we give to our bodies, habits that we have or lack etc.
- Necessities for a good health
 - (i) balanced diet, personal hygiene and regular exercise are very important to maintain good health.
 - (ii) Yoga is practiced since ancient times for proper physical and mental health.
 - (iii) awareness about diseases and their effect on different bodily functions
 - (iv) vaccination (immunisation) against infectious diseases
 - (v) proper disposal of wastes, control of vectors
 - (vi) maintenance of hygiene in food and water resources are necessary for achieving good health.
- Diseases occur when the functioning of one or more organs or organ systems of the body is adversely affected. It is characterised by appearance of various signs and symptoms.
 - (i) Infectious diseases which are easily transmitted from one person to another. e.g, Ringworm, AIDS
 - (ii) Non-infectious diseases are not transmitted from one person to another eg., Cancer

COMMON DISEASES IN HUMANS

- **Pathogens:** Organisms causing diseases in man. For example, bacteria, viruses, fungi, protozoans, helminths, etc.

A. Bacterial Diseases

(a) Typhoid

Causal organism	Source of infection	Common symptoms	Widal test
A bacterium, <i>Salmonella typhi</i> .	Disease spreads by contaminated food and water.	Sustained high fever (39° to 40°C), weakness, stomach pain, constipation, headache and loss of appetite.	Confirms the infection by <i>Salmonella</i>

(b) Pneumonia

Causal organism	Source of infection	Common symptoms
<i>Streptococcus pneumoniae</i> and <i>Haemophilus influenzae</i>	The healthy person easily acquire infection by inhaling the droplets/aerosols released by an infected person, sharing glasses and utensils with an infected person.	Fever, chills, cough and headache. In severe cases, the lips and finger nails may turn grey to bluish in colour

- (c) Dysentery, plague, diphtheria, etc., are some of the other bacterial diseases in man.

B. Viral Disease

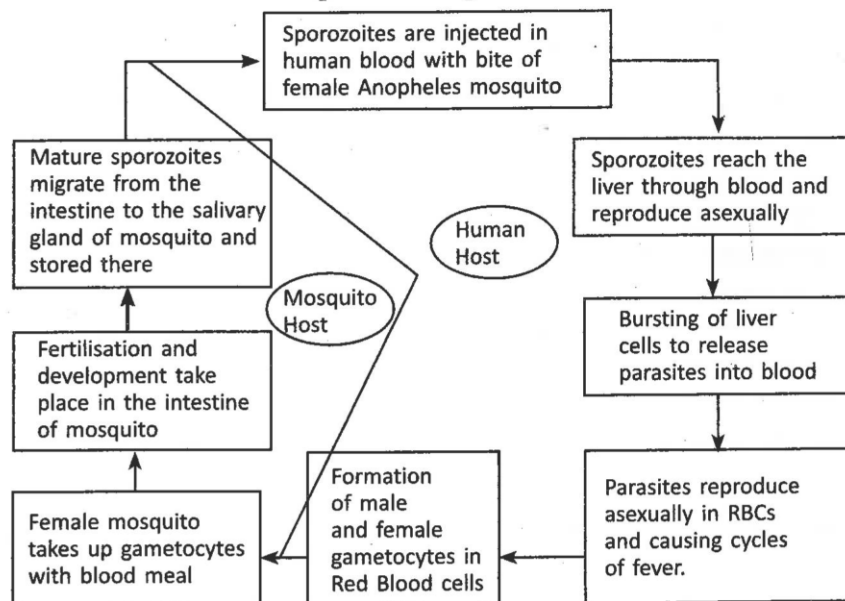
(d) Common cold

Causal organism	Source of infection	Common symptoms
Rhino viruses	Droplets resulting from cough or sneezes of an infected person are either inhaled directly or transmitted through contaminated objects.	Viruses infect the nose and respiratory passage only. It does not affect the lungs. The disease is characterised by nasal congestion and discharge, sore throat, hoarseness, cough, headache and tiredness which typically lasts for 3-7 days.

C. Protozoan Disease

(e) Malaria

- **Causal organism:** *Plasmodium*, a tiny protozoan. Different species of *Plasmodium* are *P. vivax*, *P. malariae* and *P. falciparum*. Malignant malaria caused by *Plasmodium falciparum* is the most serious and fatal.
- **Hosts:** Malarial parasite requires two hosts – human and mosquitoes – to complete its life cycle; the female *Anopheles* mosquito is the vector (transmitting agent).
- **Source of infection:** Bite of female *Anopheles*, that contains haemozoin in their saliva
- **Life cycle of *Plasmodium*:** *Plasmodium* enters the human body as infectious sporozoites through the bite of infected female *Anopheles* mosquito.



Stages in the life cycle of *Plasmodium*

(f) Amoebiasis

Causal organism	Source of infection	Symptoms	Vector
<i>Entamoeba histolytica</i> in the large intestine of humans, cause amoebiasis (amoebic dysentery).	Drinking water and food contaminated by the faecal matter	Constipation, abdominal pain and cramps, stools with excess mucous and blood clots.	Houseflies

D. Diseases by Helminthes

(g) Ascariasis

Causal organism	Source of infection	Symptoms
<i>Ascaris</i> (common round worm)	The eggs of the parasite are excreted along with the faeces of infected persons. This contaminate the soil, water, and plants, vegetables, fruits, etc	Internal bleeding, muscular pain, fever, anaemia and blockage of the intestinal passage

(h) **Elephantiasis or Filariasis**

Causal organism	Source of infection	Symptoms	Vector
<i>Wuchereria bancrofti</i> and <i>W. malayi</i>	Through the bite of female mosquito vectors.	Gradually chronic inflammation of the organs develops; parasites live in lymphatic vessels of the lower limbs for many years. The genital organs are affected resulting in gross deformities.	Female mosquito vectors transmit pathogens to a healthy person through its bite.

E. **Fungal disease**

(i) **Ringworm**

Causal organism	Source of infection	Symptoms
<i>Microsporium</i> , <i>Trichophyton</i> and <i>Epidermophyton</i>	Ringworms are acquired from soil or by using clothes or other things used by infected persons.	Main symptoms of the disease are appearance of dry, scaly lesions on various parts of the body.

PREVENTION AND CONTROL OF INFECTIOUS DISEASES

- Personal hygiene:** Keeping the body clean; consumption of clean drinking water, food, vegetables and fruits.
- Public hygiene:** Proper disposal of waste and excreta; periodic cleaning and disinfection of water reservoirs, pools, cesspools and tanks.
- Avoiding close contact with the infected persons or their belongings in case of air borne disease. For example, pneumonia and common cold.
- For vector transmitted diseases:** The most important measure is to control or eliminate mosquitoes and their breeding places. This can be achieved by avoiding stagnation of water in and around residential areas, regular cleaning of household coolers, use of mosquito nets. Introducing *Gambusia* fishes in ponds that feed on mosquito larvae, and spraying of insecticides in ditches, drainage areas and swamps, etc.
- The use of vaccines and immunisation programmes have completely eradicated deadly diseases.
- Antibiotics and various other drugs also effectively treat infectious diseases.

IMMUNITY

The ability of the host to fight the disease-causing organisms, conferred by the immune system is called **immunity**.

Types of immunity

A. Innate Immunity

Innate Immunity is a non-specific type of defense. It is present since the birth of the individuals. Innate immunity consists of four types of barriers. These are

- Physical barriers:** Skin is the main barrier preventing entry of the micro-organisms in the body. Some other physical barriers are mucus coating of the epithelium lining of respiratory, gastrointestinal and urogenital tracts help in trapping microbes entering our body.
- Physiological barriers:** HCl in stomach, saliva in mouth, and tears from eyes prevent microbial growth.
- Cellular barriers:** Some WBCs like polymorpho-nuclear leukocytes (PMNL-neutrophils) and monocytes and natural killer in the blood as well as macrophages in tissues can phagocytose and destroy microbes.
- Cytokine barriers:** The cells infected with virus secrete proteins called **interferons**. They protect non-infected cells from more viral infections.

B. Acquired Immunity

- Acquired immunity is pathogen specific. It is described by memory. When our body first time encounters a pathogen, it produces a response known as **primary response**. It is of low intensity. Successive encounter with the same pathogen produces intense **secondary response**. B-lymphocytes and T-lymphocytes in blood cause primary and secondary immune responses in the body.

- **B-lymphocytes** produce various proteins, called antibodies in response to pathogens in our blood. The T-cells themselves do not secrete antibodies but help B-cells to produce them.
- **Structure of Antibody:** Each antibody consists of four peptide chains—two small chains called **light chains** and two long chains called **heavy chains**. Therefore, an antibody is represented as H_2L_2 .
- **Types of antibodies:** IgA, IgM, IgE, IgG, IgD. The response of antibodies is known as humoral immune response because these antibodies are found in the blood.
- **Two types of immune responses**
 - **Humoral immune response:** Antibody mediated response is an acquired immune response.
 - **Cell-mediated immune response:** The second acquired immune response is cell-mediated immune response or cell-mediated immunity. The T-lymphocytes is responsible for cell mediated immunity.
- **Cause of graft rejection:** In organ or tissue transplantation matching of grafts should be essential. If the grafts are not matched, then it will be rejected by the body's immune system. Therefore, tissue matching, blood group matching is essential before grafting or transplantation of organs.

C. Active and Passive Immunity

- When a host is exposed to antigens, which may be in the form of living or dead microbes or other proteins, antibodies are produced in the host body. This type of immunity is called **active immunity**.
- Active immunity is slow and takes time to give its full effective response. For example, introducing weakened microbes purposefully during immunisation is a form of active immunity.
- When already prepared antibodies are directly administered inside the body to protect against foreign agents, is known as **passive immunity**. For example, colostrum, the yellowish fluid secreted by mother during initial days of lactation is rich in IgA antibodies. It provides protection to the infants.

D. Vaccination and Immunisation

- The principle of immunisation or vaccination is based on the property of 'memory' of the immune system. In vaccination, an antigenic preparation of proteins of pathogen or inactivated or weakened pathogen (vaccine) are introduced into the body.
- The vaccines also generate memory B and T-cells. These cells recognise the pathogen quickly on further exposure and engulf the invaders by producing antibodies in huge numbers. If a person requires quick immune response, he is directly injected with the preformed antibodies, or antitoxin. This type is called **passive immunisation**.

E. Allergies

- The exaggerated response of the immune system to various antigens present in the environment is called **allergy**. The substances which mites in dust, pollens, animal dander etc. are some allergens.
- Symptoms of allergic reactions are sneezing, watery eyes, running nose and difficulty in breathing. The IgE antibodies are produced in response to allergies in the human body. In response to allergy mast cells release **histamine** and **serotonin**.
- Various drugs such as anti-histamine, adrenalin and steroids rapidly lessen the symptoms of allergy.

F. Auto Immunity

- An autoimmune disease is a condition in which the immune system of the body mistakenly attacks the self-cells of the body. For example, **Rheumatoid arthritis**.

G. Immune System in the Body

- **Lymphoid organs** are the sites for origin, maturation and proliferation of lymphocytes.
- Two types of lymphoid organs
 - (a) **Primary lymphoid organs**
 - Bone marrow and thymus are primary lymphoid organs where immature lymphocytes differentiate into antigen-sensitive lymphocytes. The bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced. Once mature, the lymphocytes migrate to secondary lymphoid organs.
 - The thymus is a lobed organ located near the heart and beneath the breastbone. It is relatively large at the time of birth. Both bone-marrow and thymus provide suitable environment for the development and maturation of T-lymphocytes.

(b) Secondary lymphoid organs

- Spleen, lymph nodes, tonsils, Peyer's patches of small intestine and appendix are secondary lymphoid organs. The secondary lymphoid organs are the sites of interaction of lymphocytes with the antigen.
- The spleen is large and bean-shaped. It acts as a filter of the blood by trapping blood-borne microorganisms. Spleen is a large reservoir of erythrocytes.
- The lymph nodes are small solid structures located at different points along the lymphatic system. Lymph nodes trap the microorganisms or other antigens.
- There is lymphoid tissue also located within the lining of the major tracts (respiratory, digestive and urogenital tracts) called **mucosa associated lymphoid tissue (MALT)**.

H. AIDS

AIDS stands for Acquired Immuno Deficiency Syndrome. It is caused by the Human Immuno deficiency Virus (HIV).

(a) Transmission of HIV

- sexual contact with infected person
- transfusion of contaminated blood and blood products
- sharing infected needles. For example, as in case of intravenous drug abusers
- infected mother to child through placenta

(b) Infection of HIV

- Once the virus gets inside the human body, it enters into macrophages. Then, the RNA genome of the virus replicates and forms viral DNA. The viral DNA then gets incorporated into DNA of host cell to produce virus particles.
- At the same time, HIV enters into helper T-lymphocytes (T_H). The repeated attack on T_H cells, causes decrease in the number of T_H lymphocytes in the body of the infected person. During this period, the person suffers from attacks of fever, diarrhoea and weight loss.

(c) Test for AIDS

- Enzyme linked immuno-sorbent assay (ELISA) is performed.
- Antiviral drugs can prolong the life of the patient but cannot prevent death, which is inevitable.

(d) Prevention of AIDS

- (i) In case of AIDS there is no cure so, prevention is better than cure.
- (ii) In our country the National AIDS Control Organisation (NACO) and other non-governmental organisation (NGOs) are educating people about AIDS.
- (iii) WHO conducts various programmes to prevent the spread of HIV infection. Making blood (from blood banks) safe from HIV, ensuring the use of only disposable needles and syringes in public and private hospitals and clinics, free distribution of condoms, controlling drug abuse, advocating safe sex and promoting regular check-ups are some such steps taken up.
- (iv) HIV infection should not be hidden as it may spread to several people.

CANCER

- In cancerous cells, the regulatory mechanisms disrupt completely. Normal cells possess a feature known as contact inhibition. Due to contact inhibition, cells inhibits their uncontrolled growth. Cancer cells have lost this property. As a result, cancerous cells remain in dividing condition throughout. It produces a masses of cells called **tumors**.

(a) Types of tumors

Tumors are of two types: benign and malignant.

(i) Benign tumors

- Usually remain confined to their original location.
- They do not spread to other parts of the body hence cause little damage to the body cells.

(ii) **Malignant tumors**

- These are a mass of multiplying cells known as **neoplastic** or tumor cells.
- These cells grow very rapidly, and invade and damage its adjacent normal tissues.
- The neoplastic cells actively divide and grow. They also starve the normal cells by competing for vital nutrients.
- Cells detach from such tumors reach distant locations through blood. They get stuck in any part of the body and start a new tumor there. This property is called **metastasis**. It is the scariest property of malignant tumors.

(b) **Causes of Cancer**

Physical, chemical or biological agents called carcinogens cause cancer. These cause normal cells into cancerous neoplastic cells

(i) **Physical agents**

- **Ionising radiations:** X-rays and gamma rays
- **Non-ionising radiations:** UV rays cause DNA damage leading to neoplastic transformation.

(ii) **Chemical carcinogens**

Tobacco is a major cause of lung cancer.

(iii) **Biological carcinogens**

- Oncogenic viruses have cancer causing viruses. They have genes called viral oncogenes.
- Also, several genes called cellular oncogenes (c-onc) or proto oncogenes are found in normal cells which certain conditions gets activated and result in oncogenic transformation of the cells.

(c) **Cancer detection and diagnosis**

- (i) Biopsy and histopathological tests of the tissue and blood detects cancer in humans. In biopsy, a piece of the suspected tissue cut into thin section, stained and examined under microscope.
- (ii) Bone marrow tests are performed for increased cell counts in case of leukemia in the body.
- (iii) Some techniques like radiography (X-rays), CT (computed tomography) and MRI (magnetic resonance imaging) are very suitable to detect cancers of the internal organs.
- (iv) Computed tomography uses X-rays to generate a three-dimensional image of the internals of an object.
- (v) MRI detects pathological and physiological variations in the living tissue.
- (vi) Antibodies against cancer-specific antigens are also used for detection of certain cancers.

(d) **Treatment of cancer**

- (i) The common approach is surgery, radiation therapy and immunotherapy.
- (ii) In radiotherapy, tumor cells are irradiated lethally.
- (iii) Several chemotherapeutic drugs kill cancerous cells.
- (iv) Tumor cells avoid detection and destruction by immune system. Therefore, α -interferon is given to patients. It activates the immune system and destroys the tumor.

DRUGS AND ALCOHOL ABUSE

(a) **Types of Drugs**

(i) **Opioids**

- Opioids are obtained from the latex of poppy plant *Papaver somniferum*. Generally taken by snorting and injection, heroin is a depressant and slows down body functions.
- It binds to specific opioid receptors in central nervous system and gastrointestinal tract.
- **Heroin** or **smack** is chemically diacetylmorphine which is a white, odourless, bitter crystalline compound.

(ii) **Cannabinoids**

- Natural cannabinoids are obtained from the inflorescences of *Cannabis sativa*. The flower tops, leaves and resin of cannabis plant are used in various combinations to produce marijuana, hashish, charas and ganja.
- Cannabinoid receptors are present in the brain. They affect cardiovascular system of the body.

(iii) **Coca alkaloid or cocaine**

- Cocaine are obtained from coca plant *Erythroxylum coca*.
- It interferes with the transport of the neuro-transmitter dopamine.
- Cocaine (coke or crack) is usually snorted.
- It stimulates central nervous system and produces a sense of euphoria and increased energy.
- Excessive dosage of cocaine causes **hallucinations**.
- Other plants with hallucinogenic properties are *Atropa belladonna* and *Datura*.

(iv) Barbiturates, amphetamines, benzodiazepines are generally used as medicines. They help patients to cope with mental illnesses like depression and insomnia.

(v) Morphine is a sedative and painkiller. It is very useful in patients after surgery.

(vi) Tobacco is smoked, chewed or used as a snuff. It contains **nicotine**, an alkaloid. Smoking causes cancers of various body parts, such as lung, urinary bladder, throat etc. Smoking increases carbon monoxide (CO) in blood. As a result, it affects the binding of oxygen with haemoglobin, causing oxygen deficiency in the body.

(b) **Adolescence and Drug/Alcohol Abuse**

- Adventure, excitement, and experimentation, which motivate youngsters towards drug and alcohol use.
- Stress and pressures to excel in academics or examinations.
- The perception among youth that smoking or taking drug is a 'cool' or "progressive" thing, which in reality is dangerous and harmful.

(c) **Effects of Drug/Alcohol Abuse**

- Instant adverse effects of drugs and alcohol abuse includes reckless behaviour, vandalism and violence.
- Excessive doses of drugs may cause coma and death due to respiratory failure, heart failure or cerebral hemorrhage.
- A combination of drugs or their intake along with alcohol cause overdosing and even deaths.
- The most common warning signs of drug and alcohol abuse include drop in academic performance, unexplained absence from school/college, lack of interest in personal hygiene, withdrawal, isolation, depression, fatigue, aggressive and rebellious behaviour etc.
- Prolonged use of drugs and alcohol damages nervous system and liver (cirrhosis).
- Sometimes drug abuser steal money to buy drugs/alcohol.
- Intravenously injection of drugs causes serious infections like AIDS and Hepatitis B as viruses get transferred from one person to another by sharing of infected needles and syringes.

(d) **Prevention and Control**

- (i) Avoid undue peer pressure
- (ii) Education and counselling
- (iii) Seeking help from parents and peers
- (iv) Looking for danger signs
- (v) Seeking professional and medical help

QUESTION BANK

MULTIPLE CHOICE QUESTIONS

1. Which one is not a mode of transmission of HIV?

- | | |
|---|--|
| (a) Sharing the infected needles | (b) Transfusion of contaminated blood |
| (c) Shaking hands with infected persons | (d) Sexual contact with infected persons |

2. 'Smack' is obtained from

- | | |
|--|--------------------------------------|
| (a) latex of <i>Papaver somniferum</i> | (b) leaves of <i>Cannabis sativa</i> |
| (c) flowers and buds of <i>Datura</i> | (d) fruits of <i>Erythroxyl coca</i> |

3. The substance produced by a cell in viral infection that protects other cells from further infection is

- | | | | |
|----------------|---------------|----------------|-------------------|
| (a) Adrenaline | (b) Histamine | (c) Interferon | (d) Acetylcholine |
|----------------|---------------|----------------|-------------------|

4. Antibodies found in colostrum which protect the new born from various diseases is
 (a) IgG (b) IgA (c) IgD (d) IgE
5. Tobacco consumption is known to stimulate secretion of adrenaline and nor-adrenaline. The component responsible for this is
 (a) Nicotine (b) Tannic acid (c) Vincristine (d) Catecholamine
6. Which of the following glands is large in size at birth but diminishes with ageing?
 (a) Pineal (b) Pituitary (c) Thymus (d) Thyroid
7. Haemozoin is a
 (a) Toxin released from *Streptococcus* infected cells (b) Precursor of haemoglobin
 (c) Toxin released from *Plasmodium* infected cells (d) Toxin released from *Haemophilus* infected cells
8. Antivenom against snake poison contains
 (a) Antigens (b) Antigen-antibody complexes
 (c) Antibodies (d) Enzymes
9. Which of the following is not a lymphoid tissue?
 (a) Spleen (b) Tonsils (c) Pancreas (d) Thymus
10. Which of the following is not the causal organism of ringworm?
 (a) *Microsporium* (b) *T-richophyton* (c) *Epidermophyton* (d) *Macrophages*
11. A person with sickle cell anaemia is
 (a) less prone to typhoid, but more prone to elephantiasis
 (b) more prone to typhoid, but less prone to amoebiasis
 (c) less prone to malaria
 (d) more prone to malaria
12. The antibody produced against allergens more abundantly is
 (a) IgE (b) IgA (c) IgG (d) IgM
13. Which of the following cells actively participate during allergy?
 (a) B-lymphocytes (b) T-lymphocytes (c) Mast cells (d) Red blood cells
14. The drugs used to quickly reduce the symptoms of allergy are
 (a) Anti-histamine and adrenaline (b) Histamine and thyroxine
 (c) Adrenaline and α -interferon (d) All of these
15. Which of the following is an auto-immune disease?
 (a) SCID (b) Rheumatoid arthritis (c) Myasthenia gravis (d) Both (b) and (c)
16. Which out of the following groups represent auto-immune disorders?
 (a) SCID and Diphtheria (b) Diabetes mellitus (type 1) and rheumatic fever
 (c) AIDS and Cancer (d) Hepatitis and Cholera
17. Vaccine against polio viruses is an example of
 (a) Auto-immunisation (b) Passive immunisation
 (c) Active immunisation (d) Simple immunisation
18. Match Column I and Column II

Column I	Column II
A. Lymph nodes	I. trap the microorganisms
B. Thymus	II. development and maturation of T-lymphocytes
C. MALT	III. immature lymphocytes differentiate
D. Bone marrow	IV. lymphoid tissue

Select the correct option.

- (a) A-I, B-II, C-III, D-IV (b) A-II, B-I, C-IV, D-III
 (c) A-I, B-II, C-IV, D-III (d) A-IV, B-III, C-II, D-I

19. In the life cycle of *Plasmodium*, sexual reproduction takes place in which of the following hosts?
 (a) Human (b) Female *Anopheles* mosquito
 (c) Male *Anopheles* mosquito (d) Both (a) and (b)
20. Amoebic dysentery (amoebiasis) is caused by
 (a) *Entamoeba histolytica* (b) *E. coli*
 (c) *Streptococcus pneumoniae* (d) *Trichophyton*
21. Which one of the following diseases cannot be cured by taking antibiotics?
 (a) Plague (b) Amoebiasis (c) Leprosy (d) Whooping cough
22. Which of the following plants possess hallucinogenic properties?
 (a) *Erythroxylon coca* (b) *Atropa belladonna* (c) *Datura stramonium* (d) All of these
23. Which drug is being excessively taken by some sports persons nowadays?
 (a) Opioids (b) Barbiturates
 (c) Cannabinoids (d) Lysergic acid diethyl amides (LSD)
24. The primary lymphoid organs are
 (a) Spleen and thymus (b) Bone marrow and lymph node
 (c) Bone marrow and thymus (d) Thymus and MALT
25. The site where lymphocytes interact with antigens and proliferate in an effector cells are
 (a) Spleen and lymph nodes (b) Bone marrow and thymus
 (c) Peyer's patches and tonsils (d) Both (a) and (c)
26. Which drug is used as medicine to help patients cope with depression and insomnia?
 (a) Morphine (b) Amphetamines (c) Barbiturate (d) Both (b) and (c)
27. Hepatitis B vaccine is produced from
 (a) Inactivated viruses (b) Yeast
 (c) *Haemophilus influenzae* (d) *Salmonella typhimurium*
28. Use of vaccines and immunisation programmes have helped in controlling
 (a) Polio and tetanus (b) Diphtheria and Pneumonia
 (c) Cancer and AIDS (d) Both (a) and (b)
29. An intestinal parasite causing blockage of the intestinal passage and whose eggs are excreted along with the faeces of infected person is
 (a) *Wuchereria bancrofti* (b) *Ascaris sp.*
 (c) *Epidermophyton* (d) *Microsporium*
30. Elephantiasis, a chronic inflammation that results in gross deformities of organs is caused by
 (a) *Ascaris* (b) Ringworm (c) *Wuchereria* (d) *Trichophyton*
31. AIDS is diagnosed by
 (a) Widal test (b) ELISA
 (c) Polymerase Chain Reaction (d) Southern blotting
32. 'World AIDS Day' is celebrated on
 (a) 1st October (b) 31st March (c) 1st December (d) 31st December
33. Cancer cells lose the property of
 (a) Generating tumors (b) Metastasis (c) Contact inhibition (d) Division
34. Heroin is commonly called
 (a) Coke (b) Crack (c) Smack (d) Charas

35. Select the incorrect statement about cannabinoids.

- (a) Taken by inhalation and oral ingestion
- (b) Cannabinoid receptors present principally in the brain
- (c) Effects on cardiovascular system of the body
- (d) Root extract *Erythroxylum* produces cannabinoids

36. Which compound is formed by acetylation of morphine?

- (a) Heroin
- (b) Cocaine
- (c) Tobacco
- (d) Marijuana

37. Marijuana is extracted from

- (a) dried leaves and flowers of hemp plant
- (b) ergot fungus
- (c) roots of hemp plant
- (d) cocoa plant

38. Charas and ganja are the drugs which affect

- (a) respiratory system
- (b) cardiovascular system
- (c) digestive system
- (d) nervous system

39. A person suffering from leukaemia has

- (a) tumors in adipose tissue
- (b) increased number of plasma cells
- (c) increased number of melanocytes
- (d) increased number of WBCs

40. Match the following.

Column I	Column II
A. Rheumatoid arthritis	I. reservoir of erythrocytes
B. Bone marrow	II. secondary lymphoid organs
C. Peyer's patches of small intestine	III. primary lymphoid organs
D. Spleen	IV. auto-immune disease

Select the correct option.

- (a) A- I, B-II, C-III, D-IV
- (b) A-II, B-I, C-IV, D-III
- (c) A- I, B-II, C-IV, D-III
- (d) A-IV, B-III, C-II, D-I

41. A metastatic cancerous tumour is termed as 'sarcoma' if the disorder is in

- (a) fibroblasts
- (b) circulatory system
- (c) immune system
- (d) epithelial cells

42. Infective stage of malarial parasite is

- (a) Gametocytes
- (b) Sporozoites
- (c) Merozoites
- (d) Trophozoites

43. A chemical carcinogen present in tobacco smoke is responsible for

- (a) bone cancer
- (b) duodenum cancer
- (c) stomach cancer
- (d) lung cancer

44. Cocaine is obtained from

- (a) *Erythroxylon coca*
- (b) *Papaver somniferum*
- (c) *Atropa belladona*
- (d) *Datura stramonium*

45. In context of malarial parasite, fertilisation of gametes takes place in

- (a) Liver cells
- (b) RBCs
- (c) Mosquito salivary gland
- (d) Mosquito gut

46. Cocaine is commonly known as

- (a) Smack
- (b) Coke
- (c) Crack
- (d) Both (b) & (c)

47. _____ is a CNS stimulant as it interferes with the transport of _____ .

- (a) Cocaine, Aacetylcholine
- (b) Barbiturate, Glutamate
- (c) Cocaine, Dopamine
- (d) Barbiturate, Glycine

48. Major factors that cause cancer are
 (a) Oncogenes and polymorphonuclear leucocytes (b) Oncogenes and tumour suppressor genes
 (c) MHC genes (d) Cellular oncogenes and α -interferons
49. Which of the following approaches are used for the treatment of cancer?
 (a) Immunotherapy (b) Radiotherapy & chemotherapy
 (c) Surgery (d) All of these
50. The substance given to cancer patients to activate their immune system and destroy the tumour is
 (a) Histamine (b) Interleukin (c) α -interferon (d) Serotonin
51. Opioid receptors are found in
 (a) central nervous system (b) gastrointestinal tract
 (c) excretory tract (d) both (a) and (b)
52. Which of the following is affected by the infection of *Wuchereria bancrofti*?
 (a) Lymphatic vessels (b) Respiratory system
 (c) Nervous system (d) Blood circulation
53. Which of the following diseases is transmitted by the female mosquito vector?
 (a) Filariasis (b) Amoebiasis (c) Typhoid (d) Pneumonia
54. Sexual stages (gametes) of malarial parasite develop in
 (a) Liver cells (b) RBCs
 (c) Salivary gland cells (d) Mosquito body
55. Which of the following factors affect human health?
 (i) Infections (ii) Silent mutation
 (iii) Lifestyle (iv) Genetic disorders
 (a) (i), (ii) and (iv) (b) (i) and (ii)
 (c) (i), (iii) and (iv) (d) (i), (ii), (iii) and (iv)
56. Which one of the following diseases is non-communicable?
 (a) Amoebiasis (b) Flu (c) Cancer (d) Malaria
57. Which of the following pairs correctly matches a disease and a pathogen causing it?
 (a) Typhoid – *Salmonella typhi* (b) Pneumonia – *Haemophilus pneumoniae*
 (c) Malaria – *Ascaris lumbricoides* (d) Ringworm – *Entamoeba histolytica*
58. The pathogen *Microsporium* responsible for ringworm disease in humans belongs to the same kingdom as that of
 (a) *Taenia*, a tapeworm (b) *Ascaris*, a roundworm
 (c) *Rhizopus*, a mould (d) *Wuchereria*, a filarial worm
59. Match the following.

Column I	Column II
A. Ascariasis	I. <i>Trichophyton</i>
B. Ringworm	II. <i>Ascaris</i>
C. Filariasis	III. <i>Entamoeba histolytica</i>
D. Amoebiasis	IV. <i>Wuchereria</i>

Select the correct option.

- (a) A- I, B- II, C- III, D-IV (b) A- II, B- I, C- IV, D-III
 (c) A- I, B- II, C- IV, D-III (d) A- IV, B- III, C- II, D-I

60. Appearance of dry, scaly lesions with itching on various parts of the body are the symptoms of

- (a) Elephantiasis (b) Ringworm (c) Ascariasis (d) Amoebiasis

61. Which of the following pairs contains an infectious and a non-infectious disease respectively?

- (a) Typhoid and AIDS (b) AIDS and cancer
(c) Pneumonia and malaria (d) Cancer and malaria

62. Which of the following is the bacterial disease in humans?

- (a) Dysentery (b) Malaria (c) Plague (d) Both (a) & (c)

63. Which of the following pathogens causes whooping cough?

- (a) *Legionella spp.* (b) *Bordetella pertussis* (c) *Vibrio cholerae* (d) *Burcella melitensis*

64. Match the following.

Column I	Column II
A. Ascariasis	I. Round worm
B. Ringworm	II. Fungus
C. Filariasis	III. Protozoan
D. Amoebiasis	IV. Nematode

Select the correct option.

- (a) A- I, B- II, C- III, D-IV (b) A- II, B- I, C- IV, D-III
(c) A- I, B- II, C- IV, D-III (d) A- IV, B- III, C- II, D-I

65. Which of the following constitute the physiological barrier of innate immunity?

- (a) Acid in the stomach (b) Saliva in the mouth
(c) Tears from eyes (d) All of these

66. Which one of the following sets includes bacterial diseases?

- (a) Tetanus, tuberculosis, measles (b) Diphtheria, leprosy, plague
(c) Cholera, typhoid, mumps (d) Malaria, mumps, poliomyelitis

67. Hepatitis B is transmitted through

- (a) contact (b) female Anopheles
(c) coughing (d) blood transfusion

68. Select the correct statement.

- (a) *Wuchereria* affect the lymphatic vessels of the lower limbs.
(b) Ringworms are generally acquired from soil.
(c) *Entamoeba histolytica* is a protozoan parasite.
(d) All are correct

69. Select the physical and physiological barrier of innate immunity from the given options.

- (a) Gastrointestinal tracts, urogenital tracts respectively
(b) Mucus coating of the epithelium lining, saliva in the mouth respectively
(c) Saliva in the mouth, skin on our body, respectively
(d) Polymorpho-nuclear leukocytes and natural killer cells, respectively

70. A toxic substance, responsible for the chills and high fever recurring every three to four days in malarial fever, is

- (a) interferon (b) haemozoin (c) hirudin (d) Adrenaline

71. The malarial parasite reproduce _____ in liver cells of humans.

- (a) Sexually (b) Asexually (c) Binary fission (d) Multiple fission

72. Humoral immunity is associated with
 (a) T-cells (b) B-cells (c) macrophages (d) both (a) and (b)
73. The antibody which can cross placental barrier is
 (a) IgA (b) JgE (c) IgM (d) IgG
74. The most abundant class of immunoglobulins (Igs) in the body is
 (a) IgA (b) IgG (c) IgE (d) IgM
75. Consider the following statements.
 A. Each antibody molecule has four peptide chains.
 B. T-lymphocytes mediate cell-mediated immunity.
 C. Graft rejection is due to body's ability to differentiate between 'self' and 'nonself' and the cell-mediated immune response.
 D. The vaccines generate memory – B and T-cells.
 Select the correct statements.
 (a) A, B only (b) B, C only (c) A, C, D only (d) A, B, C, D
76. A protein or polysaccharide molecule that stimulates antibody formation is
 (a) antigen (b) antibiotics (c) exotoxin (d) endotoxins
77. Passive immunity can be conferred directly by
 (a) vaccines (b) antitoxins (c) colostrum (d) both (b) & (c)
78. Which form of pathogen is used in vaccination?
 (a) Activated and strong pathogenic antigens (b) Inactivated and weakened pathogenic antigens
 (c) Hyperactive and strong pathogen (d) Preformed antibodies
79. A normal gene that encodes for protein to regulate the cell growth and differentiation and due to mutation or increased expression lead to neoplastic transformation of cells is called
 (a) Oncogene (b) Proto-oncogene (c) Pseudogene (d) Operator gene
80. Injection of antitoxin in tetanus confers which type of immunisation?
 (a) Active immunisation (b) Passive immunisation
 (c) Auto-immunisation (d) Humoral immunisation
81. The term 'antitoxin' refers to a preparation containing
 (a) B-lymphocytes and T-lymphocytes (b) antibodies to the toxin
 (c) weakened pathogen (d) inactivated T-lymphocytes
82. The injection given against the snake venom contains
 (a) antigenic proteins (b) preformed antibodies (c) attenuated pathogen (d) all of these
83. Which of the following interferes with the transport of the dopamine?
 (a) Morphine (b) Hashish (c) Cocaine (d) Atropine
84. The cells of malignant tumors exhibit
 (a) Metastasis (b) Contact inhibition (c) High differentiation (d) Slow proliferation
85. Consider the following statements regarding HIV virus.
 A. Virus infects normal cells
 B. Viral DNA is produced by reverse transcriptase
 C. Viral DNA incorporates into host genome
 D. New viral RNA is produced
 E. New virus is produced
 Select the correct sequence of events.
 (a) ABCDE (b) ABCED (c) ABDCE (d) ACBDE

86. The secretion of antibodies by B lymphocytes provides

- (a) Passive immunity (b) Humoral immunity
(c) Cell mediated immunity (d) Innate immunity

87. Symptoms of ascariasis include

- A. Internal bleeding
B. Muscular pain
C. Fever
D. Anemia
E. Blockage of the intestinal passage

Select the correct option.

- (a) A B C D (b) A B D E (c) B D E (d) A B C D E

88. Malignant tertian malaria is caused by

- (a) *P. falciparum* (b) *P. vivax* (c) *P. ovale* (d) *P. malariae*

89. The immune deficiency becomes marked once the HIV starts destroying

- (a) Macrophages (b) T helper cells (c) B lymphocytes (d) NK cells

90. Select the incorrect statement about the given plant.



- (a) Morphine is obtained from it.
(b) Odourless, bitter, crystalline compound is obtained from acetylation of morphine.
(c) A depressant is obtained that increases the body functions.
(d) Heroin is obtained from the latex of this plant.

91. Consider the following statements about Human Immuno deficiency Virus (HIV).

- A. AIDS is caused by HIV.
B. HIV is member of a group of viruses called reovirus.
C. There is always a time-lag between the infection and appearance of AIDS symptoms.
D. Progressive decrease in the number of helper T-lymphocytes in the body of the infected person
E. ELISA is used to test for AIDS.

Select the correct statements.

- (a) A B C D (b) A B D E (c) B C D E (d) A C D E

92. Which of the following plant has hallucinogenic properties?

- (a) *Atropa belladonna* (b) *Datura stramonium* (c) *Erythroxylon coca* (d) All of these

93. Which of the following is an ionising radiation?

- (a) X-ray (b) Gamma rays (c) UV rays (d) Both (a) and (b)

94. HIV possess

- (a) ssRNA genome (b) ssDNA genome (c) dsRNA genome (d) dsDNA genome

95. Select the correct statement.

- (a) In active immunisation, preformed antibodies are given.
(b) Hepatitis B vaccine is produced from *E. coli*.
(c) The antibodies produced to allergens is of IgE type.
(d) Due to biochemical reasons, the body attacks self-cells.

96. The class of antibodies involved in allergic reactions is

- (a) IgA (b) IgD (c) IgM (d) IgE

INPUT-TEXT BASED QUESTIONS

Read the following paragraphs and answer the following questions.

I. A wide range of organisms belonging to bacteria, viruses, fungi, protozoans, helminths, etc., could cause diseases in man. Such disease causing organisms are called pathogens. Most parasites are therefore pathogens as they cause harm to the host by living in (on) them. The pathogens can enter our body by various means, multiply and interfere with normal vital activities, resulting in morphological and functional damage. Pathogens have to adapt to life within the environment of the host.

1. Which of the following is not a pathogenic disease?

- (a) Amoebiasis (b) Rheumatoid arthritis
(c) Ascariasis (d) Elephantiasis

2. Which of the following statements is/are correct on the basis of above paragraph?

- (i) Pneumonia is a bacterial disease which infects the lungs.
(ii) *Plasmodium* is a tiny protozoan responsible for malaria disease.
(iii) Elephantiasis is a fungal parasitic disease.
(iv) *Salmonella typhi* is a pathogenic bacterium for typhoid disease.

- (a) (i), (ii) and (iv) (b) (iii) and (iv) (c) (ii), (iii) and (iv) (d) (i) and (ii)

3. Some diseases and their pathogens are given in columns. Match Column I and II.

Column I	Column II
A. Filariasis	1. <i>Haemophilus influenzae</i>
B. Amoebiasis	2. <i>Trichophyton</i>
C. Pneumonia	3. <i>W. bancrofti</i>
D. Ringworm	4. <i>Entamoeba histolytica</i>

Select the correct option:

- (a) A1, B2, C3, D4 (b) A3, B2, C1, D4 (c) A2, B1, C3, D4 (d) A3, B4, C1, D2

4. Look at the diagram.



This is the most common infectious disease in human. Appearance of dry, scaly lesions on various parts of the body such as skin, nails and scalp are the main symptoms of the disease.

The pathogens belong to the group

- (a) Bacteria (b) Fungi (c) Protozoa (d) Viruses

5. Widal test is performed for diagnosis of

(a) Malaria

(b) Typhoid

(c) TB

(d) Pneumonia

II. Immunity is of two types: (i) Innate immunity and (ii) Acquired immunity. Innate immunity is non-specific type of defence, that is present at the time of birth. Acquired immunity, on the other hand is pathogen specific. Innate immunity consist of four types of barriers, like Physical barriers, Physiological barriers, Cellular barriers and Cytokine barriers.

Acquired immunity is characterised by primary and secondary immune responses that are carried out with the help of two special types of lymphocytes present in our blood, i.e., B-lymphocytes and T-lymphocytes.

1. During digestion, acids secreted in the stomach helps in preventing microbes to enter our body. This is an example of

(a) Physical barriers

(b) Physiological barriers

(c) Cellular barriers

(d) Cytokine barriers

2. Which cells produce immunoglobulin in blood?

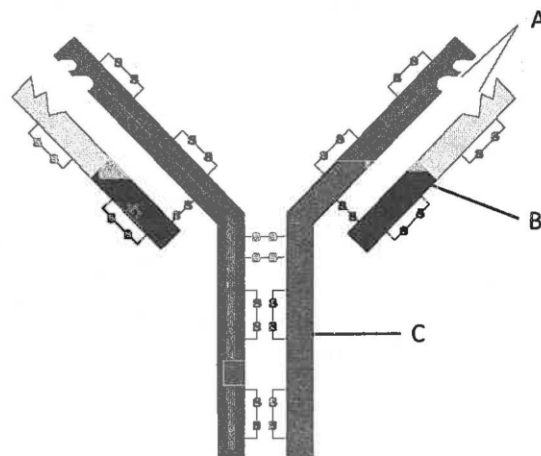
(a) B-cells

(b) NK cells

(c) T-cells

(d) Cytokines

3. Look at the diagram. It is showing structure of an antibody molecule.



B in the picture refers to

(a) Heavy chain

(b) Antigen binding site

(c) Antibody binding site

(d) Light chain

4. Sometimes the proteins secreted by virus infected cells help in protecting the non-infected cells for further viral infection. These proteins are called _____ and this is an example of _____ barriers.

(a) WBC, cellular barriers

(b) Prion, physiological barriers

(c) Interferons, cytokine barriers

(d) Virion, cytokine barriers

5. Which of the following is/are true statement(s)?

(i) Innate immunity is always pathogen specific.

(ii) Small chain of an antibody molecule is called light chain.

(iii) B lymphocytes produce antibodies.

(iv) White blood cells in our blood help in destroying microbes.

(a) (i), (iii) and (iv)

(b) (i), (ii) and (iv)

(c) (ii), (iii) and (iv)

(d) (i), (ii) and (iii)

ANSWERS

1. (c)	2. (a)	3. (c)	4. (b)	5. (a)	6. (c)	7. (c)	8. (c)	9. (c)	10. (d)
11. (c)	12. (a)	13. (c)	14. (a)	15. (d)	16. (b)	17. (c)	18. (c)	19. (b)	20. (a)
21. (b)	22. (d)	23. (c)	24. (c)	25. (d)	26. (d)	27. (b)	28. (d)	29. (b)	30. (c)
31. (b)	32. (c)	33. (c)	34. (c)	35. (d)	36. (a)	37. (a)	38. (b)	39. (d)	40. (d)
41. (a)	42. (b)	43. (d)	44. (a)	45. (d)	46. (d)	47. (c)	48. (b)	49. (d)	50. (c)
51. (d)	52. (a)	53. (a)	54. (b)	55. (c)	56. (c)	57. (a)	58. (c)	59. (b)	60. (b)
61. (b)	62. (d)	63. (b)	64. (c)	65. (d)	66. (b)	67. (b)	68. (d)	69. (b)	70. (b)
71. (b)	72. (b)	73. (d)	74. (b)	75. (d)	76. (a)	77. (d)	78. (b)	79. (b)	80. (b)
81. (b)	82. (b)	83. (c)	84. (a)	85. (a)	86. (b)	87. (d)	88. (a)	89. (b)	90. (c)
91. (d)	92. (d)	93. (d)	94. (a)	95. (c)	96. (d)				

EXPLANATION

35. The flower tops, leaves and the resin of cannabis plant are used in various combinations to produce marijuana, *hashish*, *charas* and *ganja*.
42. Mature infective stages (sporozoites) escape from gut and migrate to the mosquito salivary glands.
45. Fertilisation and development take place in the mosquito's gut.
54. Sexual stages (gametocytes) develop in red blood cells (RBCs).
69. (i) Physical barriers are skin, mucus coating of epithelium of respiratory, gastrointestinal and urogenital tracts
(ii) Physiological barriers are acid in the stomach, saliva in the mouth and tears from eyes.
(iii) Cellular barriers are leukocytes (WBC), polymorpho-nuclear leukocytes (PMNL-neutrophils), monocytes, natural killer (type of lymphocytes), macrophages, etc.
71. The parasite reproduces asexually in liver cells, bursting the cell and releasing into the blood.
75. The vaccines also generate memory – B and T-cells. These recognise the pathogen quickly on subsequent exposure and engulf the invaders with a massive production of antibodies.
The body is able to differentiate between 'self' and 'non-self'. The cell-mediated immune response is responsible for the graft rejection.
90. A depressant is obtained that slows down the body functions.
91. Human Immuno-Deficiency Virus (HIV) is a member of a group of viruses called retrovirus.
93. Ionising radiations are X-rays, beta rays and gamma rays.
94. The HIV genome consists of two identical single-stranded RNA molecules.
96. IgE is involved in allergic reactions. The immune system exaggerates to an allergen by producing antibodies called Immunoglobulin E (IgE). These antibodies travel to cells that release chemicals, causing an allergic reaction. This reaction usually causes symptoms in the nose, lungs, throat, or on the skin.

Input-Text Based Answers

I.	1. (b)	2. (a)	3. (d)	4. (b)	5. (b)
II.	1. (b)	2. (a)	3. (d)	4. (c)	5. (c)