

13.0 : Introduction**Q.1. Define health.**

Ans: Health is defined as a state of complete physical, mental and social well being.

Q.2. Define hygiene.

Ans: Hygiene is a science of health.

Q.3. Define disease.

Ans: Disease can be defined as a condition of disrupted or deranged functioning of one or more organs or systems of the body caused by infection, defective diet or heredity.

Q.4. Define resistance.

Ans: Resistance is the ability to ward off damage or disease through our defense mechanism.

Q.5. Which factors maintain good health?

Ans: Balanced diet, personal hygiene, regular exercise and good habits maintains good health.

13.1 : Concepts of Immunology : Types of Immunity**Q.6. Write a short note on branches of immunology.**

Ans: There are various branches of immunology.

- i) **Basic immunology :** The study of structure and function of immune system is called basic immunology.
- ii) **Clinical immunology :** This branch deals with clinical practices such as vaccination, organ transplantation, blood banking, immunopathology etc.
- iii) **Laboratory immunology:** It is a branch of immunology dealing with testing of cellular and humoral immune function.
- iv) **Serology:** It is a branch of immunology which includes study of antigen-antibody reaction.

Q.7. Define the following terms.

- i) **Immunity** ii) **Immunology.** iii) **Antigen** iv) **Antibody**

Ans:i) Immunity : Immunity is defined as 'the ability of the body to recognize, neutralize or destroy and eliminate harmful foreign substances, including micro-organisms.'

ii) **Immunology :** It is the science that deals with the study of immune responses to foreign substances and their role in resisting infection.

iii) **Antigen :** Any -foreign substance invading body and capable of stimulating an immune response, is called as an antigen.

iv) **Antibody :** The protective chemical produced by immune cells in response to an antigen is called an antibody.

Q.8. What are antigens ?

Ans: Antigens are the foreign substances which invade the body and capable of stimulating an immune response.

Q.9. Enlist characteristics of immune system.

- Ans:**i) It can differentiate between self(own body cells or molecules) and non-self(foreign molecules).
ii) It possesses immunological memory.

Q.10. What is immunity ? Mention its types.

Ans: Immunity is the ability of the body to recognize, neutralize or destroy and eliminate harmful foreign substances including micro-organisms Immunity is classified into two basic types :

- i) **Innate immunity/non-specific immunity.**
- ii) **Acquired immunity/specific immunity.**

Q.11. Define 'Innate immunity'.

Ans: Innate immunity is the inborn capacity of the body to resist the invasion of micro-organisms into it.

Q.12. Describe various defence mechanisms.

Ans: There are two types of defence mechanisms against microbes.

- i) **Innate immunity or non-specific immunity**
- ii) **Acquired immunity or specific defence mechanism**

i) **Innate immunity :**

Innate immunity is the inborn capacity of the body to resist the invasion of micro-organisms into it. It is present from birth, hence called inborn immunity. It is also called natural immunity. It is non-specific i.e. operates without immune memory and secondary response and remains throughout the life of an individual. Innate immunity operates through various types of barriers that prevent entry of foreign agents into the body. If the pathogens enter the body, they are quickly killed by other components of innate immunity.

a) **Barriers of innate immunity system :**

1) **Anatomical barriers:** Anatomical barriers prevent the entry of micro-organisms into the body. They include skin and mucous membranes.

i) **Skin :** It is the outermost body surface.

Periodic shedding of epidermal cells also helps to remove micro-organisms at the skin surface. It prevents the entry of a microbe due to presence of the stratum corneum.

ii) **Mucous membrane :** Internal lining of digestive, respiratory, urinary and reproductive system secrete mucous which trap micro-organisms within body.

2) **Physiological barriers :** Physiological barriers such as body temperature, pH and body secretions prevent growth of many invading pathogenic micro-organisms. During infection and inflammation, body temperature elevates which is known as fever. Fever inhibits the growth of many pathogens. Strong acidity of gastric juice in stomach (pH 1.2 to 3.0) kills most of the ingested micro-organisms. Lysozyme is a bacteriolytic enzyme, present in tears, which digests bacterial cell walls.

3) **Phagocytic barriers:** Phagocytes are specialized cells of our body that engulf and destroy invading microbes and thus protect the body. The most important phagocytes are macrophages, neutrophils and monocytes. e.g. Kupffer cells of liver.

4) **Inflammatory barriers:** An infection or tissue injury often causes redness, swelling, pain and the production of heat that may result in fever. Such localized manifestation is called inflammatory response. This response is due to release of certain chemicals such as histamines and prostaglandins, by damaged mast cells of connective tissue and basophils of blood. These chemicals dilate and make the blood capillaries more permeable in the region of tissue injury. The vascular fluid comes out of the blood vessels. This fluid contains serum proteins which kill bacteria.

ii) **Acquired immunity** is the resistance that body develops during lifetime

Types of acquired immunity :

Acquired immunity may be active or passive

a) **Acquired active immunity :**

It is the resistance developed by an individual as a result of an antigenic stimulus of invading pathogens or vaccine. This immunity is acquired by activating immune system of the body and results in production of antibodies.

Acquired active immunity is of two types :

1) **Natural acquired active immunity :** Immunity acquired due to infection is called natural acquired active immunity. It is developed after the pathogen enters the body. For e.g. A person who has recovered from an attack of measles develops natural acquired active immunity to measles for the life time.

2) **Artificial acquired active immunity:** It is the immunity which is acquired artificially by vaccination. Vaccines consist of dead or alive but attenuated (artificially weakened) pathogens or toxoids. They are introduced into the body to stimulate the formation of antibodies by the immune system. e.g. Polio vaccine, BCG vaccine, etc.

b) **Acquired passive immunity :**

Passive immunity is acquired when ready-made antibodies are received by or introduced into the body.

It can be acquired either naturally or artificially.

- 1) **Natural acquired passive immunity** : Before birth maternal antibodies are transferred from mother to foetus through placenta while after birth the antibodies are transferred from mother to infant through colostrum. The antibodies received by the child from mother remain in the body for short time. Hence, natural acquired passive immunity is short lived.
- 2) **Artificial acquired passive immunity** : Immunity which is developed by injecting previously prepared antibodies using serum from humans or animals is called artificial acquired passive immunity. For e.g. antibodies obtained from hyperimmunized horses are injected to humans against rabies pathogens.

Q.13.Explain in detail acquired active immunity and passive immunity. [Mar 2013 old course]

Ans: Refer Q.12.

Q.14. What is innate immunity? Explain different barriers of innate immunity system. [Mar 08]

OR

Describe the various types of barriers of innate immunity.

Ans: Refer Q. 12.

Q.15. Which kind of immunity is provided by vaccination?

Ans: Artificially acquired active and passive immunity is provided by vaccination.

Q.16. Which kind of barrier is present in stomach ?

Ans: Physiological barrier is present in stomach.

Q.17.Explain in brief the concepts of immunology.

- Ans:**
- i) Immunology is the science that deals with the study of immune responses to foreign substances and their role in resisting infection.
 - ii) The study of structure and function of immune system is called basic immunology.
 - iii) Any foreign substance invading body and capable of stimulating an immune response, is called as an antigen.
 - iv) The protective chemical produced by immune cells in response to an antigen is called an antibody.
 - v) Immunity refers to the general ability of a body to recognize, neutralize or destroy and eliminate foreign substances.

Q.18. Explain role of innate immunity.

- Ans:**
- i) Innate Immunity is a form of non specific host defense against invading bacteria.
 - ii) It is a natural or "innate" to the host, depending in part on genetics.
 - iii) Innate defense mechanisms are continually ready to respond to invasion and do not require a period of time for induction.
 - iv) The most important components of innate immunity are anatomical barriers, tissue bactericides including ability to undergo inflammatory and phagocytic responses.
 - v) The skin and mucous membrane provide physical and chemical barriers to infection. The internal tissues invariably contain bactericidal substances. The most noteworthy antibacterial substance is the enzyme lysozyme, which is present in mucus and all body tissues and secretions.
 - vi) If these barriers are penetrated, the body contains cells that respond rapidly to the presence of the invader. These cells include macrophages and neutrophils that engulf foreign organisms and kill them.
 - vii) Bacterial invasion is also challenged by an inflammatory process.

Q.19.Define 'Acquired immunity'.

Ans: Acquired immunity is the resistance that body develop during lifetime.

Q.20. What is acquired immunity? Explain its unique features. OR

Explain the unique features of acquired immunity.

Ans: Acquired immunity :

- i) Acquired immunity is the resistance that an individual acquires during its lifetime.
- ii) It is found only in vertebrates and supplements the protection provided by innate immunity.
- iii) This immunity is acquired by activating immune system of the body and results in production of antibodies.

Unique features of acquired immunity:**i) Specificity :**

Acquired immunity is specific for each type of pathogen. It has the ability to differentiate between various foreign molecules.

ii) Diversity :

It has the ability to recognize vast variety of diverse types of pathogens.

iii) Discrimination between self and non-self :

It is able to differentiate between own cells (self) and foreign cells or molecules (non-self).

iv) Memory :

When the immune system encounters a specific pathogen for the first time, it generates immune response and eliminates the invader. The immune system retains the memory of this encounter. As a result, a second encounter with same pathogen stimulates immune response.

Q.21. What is an acquired immunity? Explain in detail, acquired active and passive immunity.

Ans: Refer Q. 12.

Q.22. What is immunity? Describe different types of immunity.

Ans: Refer Q. 7(i) and 12.

Q.23. Which are the chief cells of acquired immune system?

Ans: Lymphocytes are the chief cells of acquired immune system.

Q.24. What are the different types of cells concerned with acquired immunity?

Ans: There are two different types of cells associated with acquired immunity viz. lymphocytes and antigen presenting cells.

Lymphocytes:

- i) These are the chief cells of immune system.
- ii) They are produced from pluripotent stem cells in red bone marrow by a process called haematopoiesis.
- iii) Some immature cells travel to thymus where they mature into thymocytes or T lymphocytes or T-cells.
- iv) Lymphocytes which mature in the bone marrow are called B lymphocytes or B-cells.
- v) T-cells generate cell mediated or cellular immunity whereas B-cells generate antibody mediated or humoral immunity.
- vi) B-cells further differentiate into plasma cells and memory cells.

Antigen presenting cells:

- i) These cells are sub-group of T-cells. They are also called helper T-cells.
- ii) The helper T-cells interact with antigen and become activated. Activated T-helper cell is able to produce lymphokines which destroy the antigens.

Q.25. What is haematopoiesis ?

Ans: It is the process in which B and T lymphocytes are produced from stem cells in bone marrow.

Q.26. Differentiate between B-lymphocyte and T lymphocyte.

Ans:

No.	B-lymphocyte	T lymphocyte
i)	B lymphocytes mature in bone marrow	T lymphocytes mature in the thymus gland
ii)	They are part of the humoral response	They are part of the cell mediated response.
iii)	B lymphocytes produce specific plasma cells which produces antibodies.	T lymphocyte produce clone T cells and can kill the infected cell

Q.27. Differentiate between Innate Immunity and Acquired Immunity.

OR

Explain the difference between inborn and acquired immunity.

Ans:

No.	Innate immunity or non-specific immunity	Acquired or Specific immunity
i)	It is present since birth.	It develops after birth during ones own life time.
ii)	It is inheritable immunity.	It is non-inheritable immunity.
iii)	It is not acquired from previous attacks of the disease.	It developed by of infection 111. IS way or immunization.
iv)	It remains throughout the life.	It is either short lived or may persist throughout the life.
v)	It is non-specific for any particular disease.	It is specifically produced against a particular disease.
vi)	Innate immunity is seen in all animals.	Acquired immunity is seen only in vertebrates
vii)	Innate immunity consists of various types of barriers for defense.	Acquired immunity consist of various types of cells producing antibodies.

Q.28. Differentiate between Active and Passive immunity.

Ans:

No.	Active Immunity	Passive Immunity
i)	When an antigen attacks the body of an organism, antibodies are developed in the body. This immunity is called active immunity.	When ready-made antibodies are directly given to protect body against foreign agents, immunity is called as 'Passive immunity'.
ii)	It has no side effects.	It may cause reaction.
iii)	It is provides relief only after long period .	It is provides immediate relief.
iv)	It is long lasting immunity	It is short lived immunity

Q.29. Describe the mechanism of action of T-lymphocytes.

Ans: i) On coming in contact with an antigen a T-Lymphocyte forms a clone of T-cells which are similar but they perform different functions. The clone has four types of T-lymphocytes :

- a) Helper T-cells b) Killer T-cells
- c) Suppressor T-cells d) Memory T-cells.

a) Helper T-cells :

Sensitized helper T-cells produce lymphokines for performing several types of functions like proliferation of other T-cells, stimulation of B-Lymphocytes, attraction of macrophages etc.

b) Killer T-cells or Cytotoxic T-cells :

They directly attack and destroy invading microbes, infected body cells and cancer cells. Killer T-cell bind to infected cell and secrete perforins. Then perforins produce a hole in infected cell. It also releases cell killing substances, hence the name cytotoxic T-cell.

c) Suppressor T-cells :

These cells suppress entire immune system to attack on the own body cells.

d) Memory T-cells :

These cells were previously sensitized and retain the sensitization for future.

Q.30. Describe the mechanism of action of B- lymphocytes.

Ans:i) B-lymphocytes are sensitized both directly by antigens as well as by helper T-cells.

- ii) Activated B-lymphocytes multiplies very fast to produce clone of plasma cells and memory B-cells. The plasma cells produce specialized glycoproteins called antibodies which are passed through body fluids (humor) like blood and lymph.
- iii) The antibody molecules may bind to a cell membrane or they may remain free,
- iv) The free antibodies have three main functions: Agglutination of particulate matter, including bacteria and viruses.
- v) The immobilized mass is then engulfed by phagocytes. Opsonization or coating of bacteria to facilitate their subsequent phagocytosis by macrophages and neutralization of toxins released by bacteria e.g., tetanus toxin.
- vi) Each antibody is specific for a particular antigen.

Q.31. If a schoolboy who has got snakebite is admitted in hospital after first aid, what will be the first step of the treatment ?

- Ans:**i) In a snakebites, injections containing antibodies against snake venom should be given.
ii) It helps in passive immunization.

Q.32. Name the types of cells that produce antibodies.

Ans: B- lymphocyte.

13.2 : Structure of Antibody

Q.33. Define Epitopes and paratope .

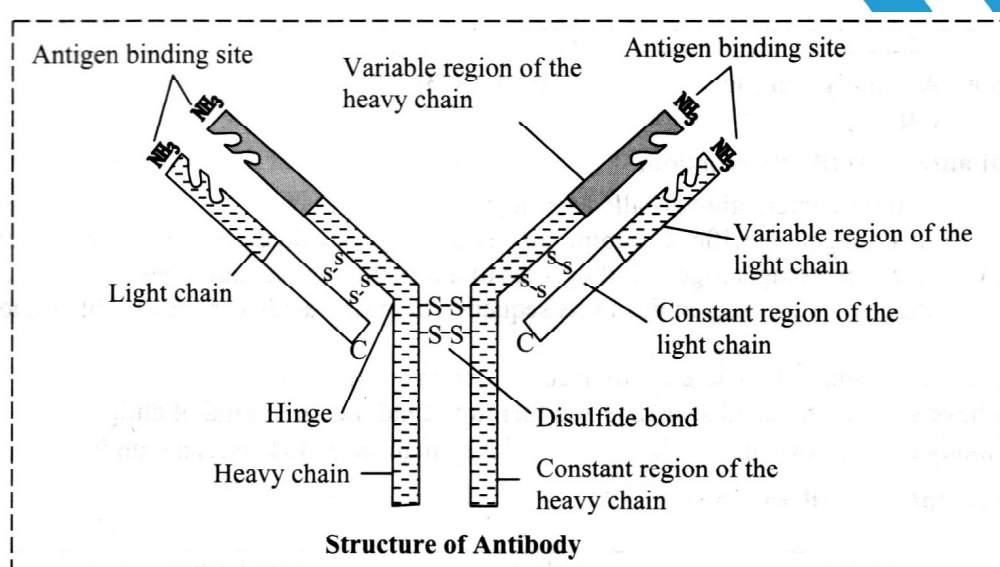
- Ans:**i) **Epitopes** : Combining sites of an antigen are called epitopes.
ii) **Para tope** : Antigen binding sites of antibodies are called as paratopes.

Q.34. Draw a well labelled diagram of an antibody molecule.

OR

Sketch and label the basic structure of an antibody.

Ans:



Q.35. Describe the basic structure of an antibody with the help of suitable diagram.

OR

Describe the structure of an antibody.

[Mar 2014]

Ans: For diagram refer Q. 34.

- Each antibody is a glycoprotein molecule called as Immunoglobulin (Igs).
- Each antibody molecule is 'Y' shaped.
- It consists of four polypeptide chains interconnected by disulphide bonds.
- It has two long chains called Heavy chains (H-chain) and two short chains called light chains (L - chain).
- Each chain has constant and variable region.
- The vertical 'stem' of 'Y' is called Fe portion (Fragment crystallisable) and it is made up of only 'H' - chains and also called constant fragment.
- The arm of 'Y' are made up of 'H' and 'L' chains and are called Fab (Fragment antigen binding).
- The antigen combines with the antibody at the antigen binding site (Paratope) in a lock and key manner.
- The actual binding site is made up of one fourth of the heavy chains and one half of the light chains.
- Heavy chain has flexible Hinge region which holds arms and stem of antibody.
- Most antibodies have two antigen binding sites (Paratope), hence are called bivalents.

Q.36. Why an antibody is represented as H_2L_2 ?

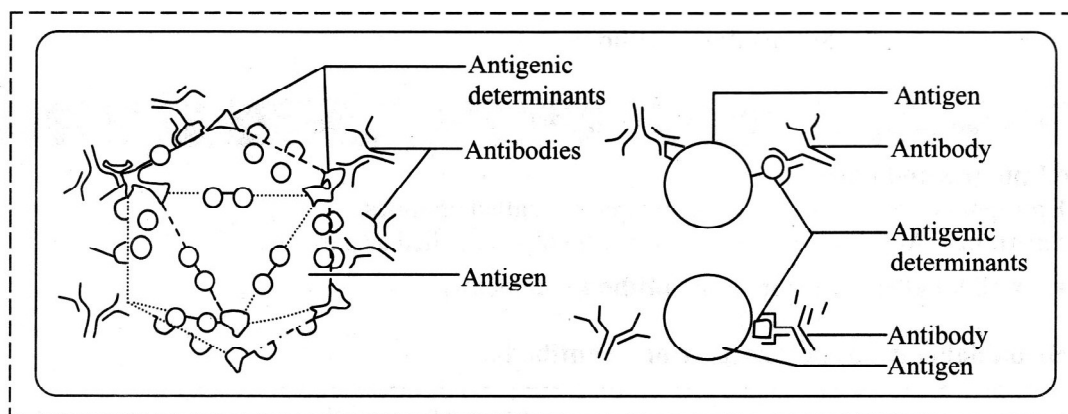
Ans: An antibody contains four peptide chains. Among them two chains are small called as light chains. Two chains are heavy chains. It has two heavy and two light chains hence is called as H_2L_2 .

Q.37. Define the Serology.

Ans: Serology : It is the branch of immunology which deals with the study of antigen-antibody interactions.

Q.38. Draw a labelled diagram showing the antigen-antibody complex.

Ans:



Q.39. Describe the Antigen - Antibody complex.

[Oct 2013]

OR

Give an account of antigen antibody reaction.

- Ans:**
- Study of antigen - antibody interaction is called serology.
 - Antibodies are always antigen specific. Combining sites of antigen, called antigenic determinants or epitopes react with corresponding antigen binding sites of antibodies called paratopes.
 - Specificity of an antibody for an antigen lies in its sequence of amino acids within variable regions of two chains.
 - These are active sites of antibody where the molecules bind to specific antigens.
 - Both the arms have same amino acid sequence and therefore bind the same kind of antigen.
 - Thus each antibody can join two antigen like Lock and Key manner called antigen - antibody complex.

Q.40. Distinguish between antigen and antibody.

Ans:

No.	Antigen	Antibody
i)	Any foreign material which bring about an immune response in the body is called antigen.	Biochemical formed in the body to fight against antigens is called as antibody.
ii)	It triggers the formation of antibodies.	It is produced against antigens.
iii)	It may be either a protein or polysaccharide	It is proteinaceous.
iv)	It may be free molecules or components of surface covering of microbe.	It is extruded from surface of plasma cells.
v)	Shapes of antigens are variable.	Antibodies are Y-shaped.

Antigens on blood cells

Q.41. Write a note on ABO blood group system.

OR

Explain ABO blood group.

- Ans:**
- The A, B and O blood group system was discovered by Karl Landsteiner in 1900.
 - Landsteiner found two antigens or agglutinogens on the surface of human red blood cells and named them as antigen A and antigen B.
 - He also noticed the corresponding antibodies or agglutinins in the serum called a and b.
 - In ABO system, the blood groups are determined by the presence or absence of antigen A and antigen B.
 - Blood groups are of four types viz A, B, AB and O.
 - Person with blood group 'O' do not have any antigen on the surface of their RBCs. Hence called as universal donor.

Q.42. How is the blood of a person classified ?

OR

Explain antigens on blood cells.

- Ans:** i) Blood groups are decided according to the antigens present on RBC and antibody present in plasma.
 ii. There are two antigens 'A' and 'B' which decide the blood group of people.
 iii) People with blood group A have the A antigen on the surface of their RBCs and antibodies to antigen B in their plasma.
 iv) People with blood group B have the B antigen on the surface of their RBCs and antibodies to antigen A in their plasma.
 v) Individuals with AB blood group have both antigen A and antigen B on their RBCs and no antibodies in their plasma.
 vi) People with blood group O are without antigen on the surface of their RBCs, but have antibodies for both antigen in their plasma.
 vii) Blood groups are determined by genes for blood group, denoted by I.
 viii) It has three alleles, I^A , I^B and I^O , where I^A and I^B are dominant and I^O is recessive gene.

Q.43. What is Rh factor ?

Ans: Rh factor is an antigen (antigen D) present on surface of red blood cells.

Q.44. In which animal Rh factor was first discovered ?

Ans: It was first discovered on the surface of RBCs of Rhesus monkey.

Q.45. Write a note on the following :

i) Rh factor.

- Ans:** i) Rh factor is an antigen (antigen D) present on surface of red blood cells.
 ii) It was first discovered by Landsteiner and Wiener (1940) on the surface of RBCs of Rhesus monkey, hence named as Rh factor.
 iii) Person having D antigen are called Rh positive (Rh⁺), and those lacking D antigen are called Rh negative (Rh⁻).
 iv) Rh⁺ antigen induces a strong immunogenic response when introduced into Rh⁻ individuals.
 v) Rh factor is also important in blood transfusion.

ii) Haemolytic disease of the new born (HDN)/ Erythroblastosis foetalis.

- Ans:** i) When Rh⁻ woman bears Rh⁺ foetus, the Rh⁺ RBCs (Rh antigens) from the foetus enter the mother's circulatory system during child birth.
 ii) The mother produces anti-Rh antibodies as immune response due to sensitization.
 iii) The first baby is born without harm but any subsequent Rh⁺ foetus will be exposed to the anti-Rh antibodies.
 iv) Anti-Rh antibodies which enter the foetus cause agglutination of the foetal RBCs and haemolysis.
 v) This is termed as haemolytic disease of newborn (HDN) or also called erythroblastosis foetalis.
 vi) In order to prevent HDN, Rh⁻ mothers are injected with antibodies against antigen D [Coombs' serum] after delivery or abortion.

Q.46. Give reasons for the following :

i) Person having blood group 'O' negative is called universal donor.

- Ans:** a) Person having blood group 'O' is called universal donor because it has no antigen on its RBCs.
 b) Hence, such blood sample does not trigger immune response in the recipient and there is no danger of agglutination.
 c. People with negative blood groups can only take negative blood types. People with positive blood groups can take either positive or negative, so that is why only blood group O^{-ve} is the universal blood donor.

ii) Person having blood group 'AB' is called universal recipient.

- Ans:** a) Person having blood group 'AB' is called universal recipient because in his blood there are no antibodies present.
 b) Hence, no immune response is triggered even if any blood group antigen enters into blood group 'AB'.

Q.47. Foetus receives some antibodies from mother through placenta. What kind of immunity is it ?

Ans: It is a passive immunity.

13.3 : Pathogens and Parasites

Q.48. Define pathogen and parasite.

Ans: Parasite: An organism that lives and feeds in or on a host is called parasite.

Pathogen : A microorganism that causes disease in its host is called pathogen.

Q.49. Define pathogenicity.

Ans: Pathogenicity is the ability of an organism to enter a host and cause disease.

Q.50. Which are the types of parasites ?

Ans: There are two types of parasites.

- i) Ectoparasites
- ii) Endoparasites

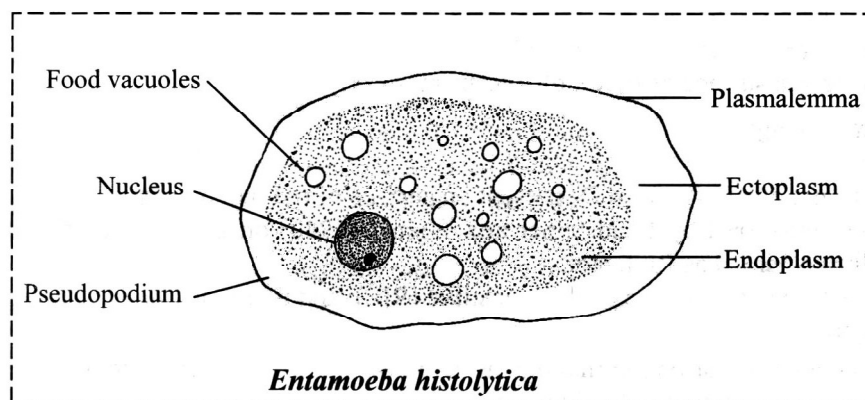
Amoebiasis

Q.51. What is amoebiasis ?

Ans: Amoebiasis is an inflammation of the intestine caused by a parasite *Entamoeba histolytica*.

Q.52. Sketch and label the diagram of *Entamoeba histolytica*.

Ans:



Q.53. Which is the causative organism for amoebiasis ? Describe the modes of transmission of amoebiasis.

- Ans:**
- i) *Entamoeba histolytica* is a protozoan causing amoebiasis.
 - ii) Amoebiasis is usually transmitted by the faeco-oral route.
 - iii) It can be transmitted by indirectly through contact with dirty hands or objects as well as by analoral contact.
 - iv) It is transmitted through contaminated food and water. Infection spreads through ingestion of cyst form of parasite.

Q.54. What are various forms of *Entamoeba histolytica* ?

Ans: There are two forms of *Entamoeba histolytica* :

- a) Encysted form
- b) trophozoites

Q.55. What are the symptoms of amoebiasis ?

- Ans:**
- i) Symptoms of amoebiasis can range from mild diarrhoea to dysentery i.e. with blood and mucus in the stool.
 - ii) Severe amoebiasis infection (known as invasive or fulminant amoebiasis) causes amoebic dysentery or amoebic colitis.
 - iii) If the parasite reaches the bloodstream it can spread through the body, most frequently ending up in the liver where it causes amoebic liver abscesses.

Q.56. How can Amoebiasis be prevented ?

Ans: Amoebiasis can be prevented by following measures:

- i) One should take care of personal hygiene.
- ii) Always wash your hands with soap and water after using the toilet and before eating or preparing food.
- iii) Avoid eating raw food.
- iv) Water should be boiled before drinking.
- v) Use pasteurized dairy products.
- vi) Sedimentation and filtration of water supplies are necessary to reduce infection.
- vii) Wash your hands atleast for 10 seconds after using toilet or changing baby diaper.
- viii) Clean toilets and bathrooms frequently.
- ix) Avoid growing raw vegetables using human faeces.
- x) Avoid eating food under unhygienic conditions.

Malaria

Q.57. Which species of plasmodium infect human being ?

Ans: *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae*.

Q.58. Describe the life cycle of Plasmodium causing malaria.

OR

Describe life cycle of malarial parasite.

Ans: A protozoan called Plasmodium is an actual organism causing malaria. Plasmodium requires two hosts, man and Anopheles mosquito to complete its life cycle.

i) Life Cycle of Plasmodium in Mosquito.

- When an Anopheles mosquito bites an infected person, the gametocytes of mosquitoes are sucked along with the blood meal.
- Once ingested they get differentiated into male and female. Later they fuse to form ookinets that penetrate the gut lining and produce an oocyst in gut wall. When the mosquito bites another human, sporozoites are injected into the blood stream.

ii) Life Cycle of Plasmodium in Human

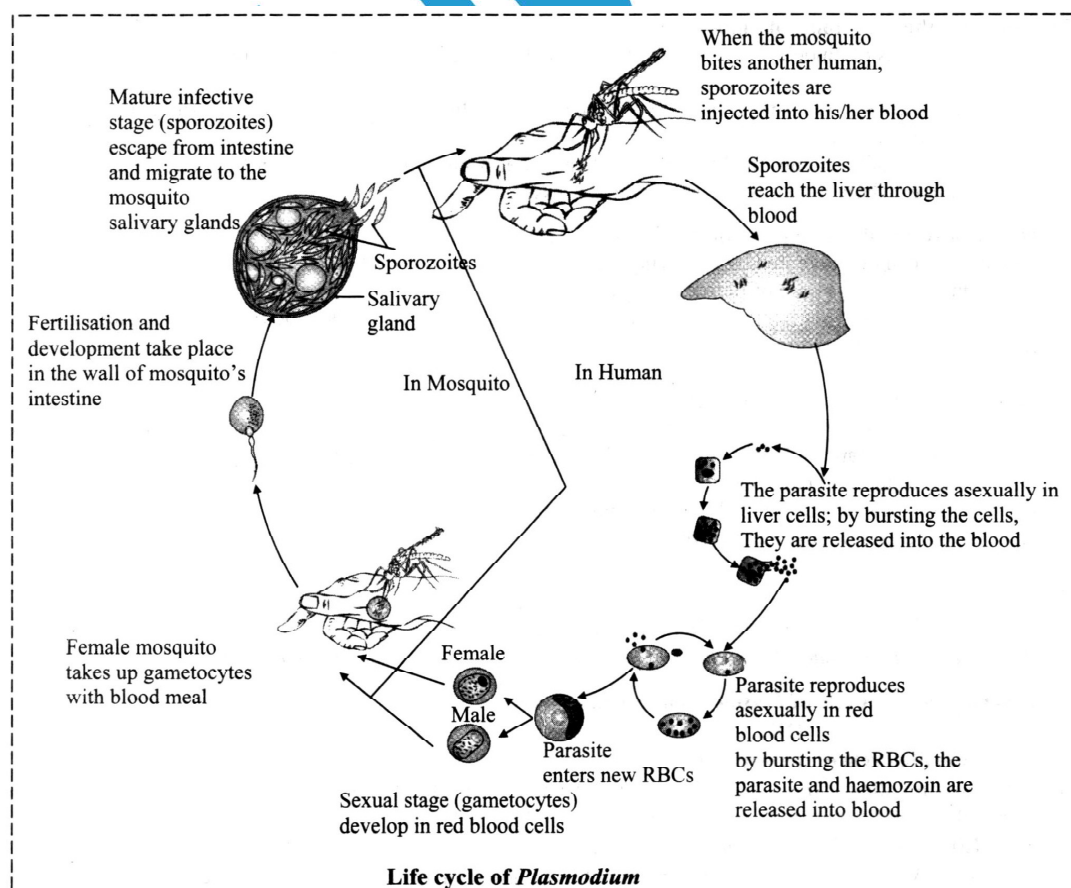
a) Malaria develops via two phases :

i) Pre-erythrocytic phase

ii) Erythrocytic phase.

Pre-erythrocytic phase involves infection of the liver. Erythrocytic phase involves infection of the erythrocyte or red blood cells.

- When a mosquito bites a healthy human being, the **sporozoites** (infectious form) are injected into the body.
- They reach the liver and start multiplying and form **merozoites** in liver cells.
- They rupture the liver cells, and escape into the bloodstream.
- Then, merozoites infect red blood cells, where they develop into ring forms, **trophozoites** and then **schizonts** which in turn produce further merozoites.
- Within the erythrocyte, the parasites multiply asexually, periodically breaking out of their hosts to invade fresh red blood cells. Several such amplification cycles occur.
- Thus, classical descriptions of waves of fever arise from simultaneous waves of merozoites escaping and infecting red blood cells.



Q.59. Which organism is responsible for causing malaria ?

Ans: Plasmodium, a protozoan is responsible for causing malaria.

Q.60. Who acts as a transmitting agent for causing malaria ?

Ans: The female Anopheles mosquito acts as a transmitting agent for causing malaria.

Q.61. What is haemozoin ?

Ans: Haemozoin is a toxic substance associated with rupture of RBCs. It is responsible for chill and high fever recurring every three to four days.

Q.62. What is schizont ?

Ans: Schizont is a cell formed from a trophozoite during the asexual stage of the life cycle of plasmodium

Q.63. What is sporozoite?

Ans: Sporozoites are the infectious form of Plasmodium.

Q.64. What are the symptoms of malaria ?

Ans: Malaria is characterised by,

- i) Fever at periodic interval.
- ii) Sudden acute chilliness or rigor stage.
- iii) Shivering, joint pain, headache, muscle ache and tiredness.
- iv) Nausea, vomiting and diarrhoea may also occur.
- v) Fever and sweating lasting four to six hours, occurring every two days in *P. vivax* and *P. ovale* infections, while every three days for *P. malariae*. Severe malaria is almost exclusively caused by *P. falciparum* infection.
- vi) Splenomegaly (enlarged spleen), severe headache, cerebral ischemia, hepatomegaly (enlarged liver), hypoglycemia, and hemoglobinuria with renal failure may occur.

Q.65. State the control measures to prevent malaria.

Ans: Following are the important measures to control or eliminate malaria :

- i) Avoid stagnation of water in and around residential areas.
- ii) Use of mosquito nets, mosquito repellent creams.
- iii) Introducing fishes like Gambusia in ponds that feed on mosquito larvae.
- iv) Spraying of insecticides in ditches, drainage areas and swamps, etc.
- v) Doors and windows should be provided with wire mesh to prevent the entry of mosquitoes.
- vi) Drain standing water where mosquitoes can lay their eggs.

Q.66. Write a note on Malaria.

- Ans:**
- i) It is a protozoan disease caused by the infection with parasites of the genus *Plasmodium*.
 - ii) *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae* are the causative agents of malaria.
 - iii) Mosquito is the vector of this disease.
 - iv) Disease results from the multiplication of malaria parasites. For *symptom and prevention refer Q.64 and 65.*

Q.67. Which fish is used to eradicate mosquito larvae ?

Ans: Gambusia fish is used to eradicate mosquito larvae.

Filariasis

Q.68. What is elephantiasis ?

Ans: The disease caused by nematode *Wuchereria bancrofti* is called elephantiasis. It is also called filariasis.

Q.69. Write the mode of transmission of filariasis.

Ans: Filariasis is usually transmitted through the bite of an infectious mosquito.

Q.70. Enlist the types of filariasis according to the body parts they affect.

Ans: Lymphatic filariasis, subcutaneous filariasis, serous cavity filariasis.

Q.71. How can filariasis be prevented?

- Ans:**
- i) Avoid of mosquito bites by use of mosquito nets or mosquito repellents.
 - ii) Limit outdoor activities at night particularly in rural or jungle areas.

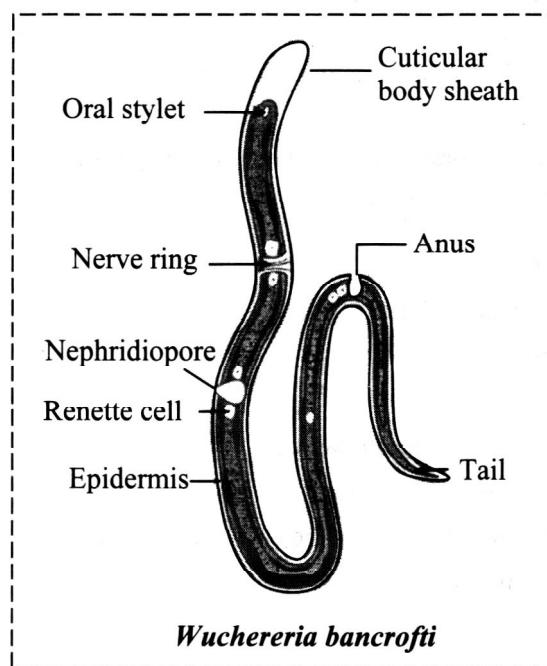
Q.72. Which worms cause lymphatic filariasis?

Ans: *Wuchereria bancrofti*, *Brugia malayi* and *Brugia timori* cause lymphatic filariasis.

Q.73. How is filariasis treated and prevented ?

Ans: The filariasis can be cured by drugs like ivermectin, albendazole and diethyl carbamazine (DEC). It can be prevented by taking precaution against mosquito bites.

Q.74. Draw a well labelled diagram of *Wuchereria bancrofti*.



Q.75. How does *Wuchereria* cause elephantiasis in man ?

OR

Describe the life cycle of *Wuchereria bancrofti*.

Ans: Life cycle of *Wuchereria bancrofti* :

- i) *Wuchereria bancrofti* has a complicated life cycle consists of five stages.
- ii) After mating of male and female worms female give birth to thousand of micro filariae.
- iii) Microfilariae are taken up by insect vector.
- iv) In vector host (intermediate host) microfilariae moult and develop into 3rd stage larvae.
- v) When female mosquito bites such infected person, infectious larvae enters into its body along with blood.
- vi) When same female mosquito bites to healthy person, pathogens get deposited in the dermis of the skin.
- vii) After about one year, the larvae moult through two more stages maturing into adult.

Q.76. Write a note on filariasis.

- Ans:**
- i) This disease is caused by nematode *Wuchereria bancrofti*
 - ii) Filariasis is usually transmitted through the bite of an infectious mosquito.
 - iii) It is also called elephantiasis due to enlargement of body parts like legs.
 - iv) Elephantiasis results when the parasites lodge in the lymphatic system. Different species of filarial worm affect different parts of the body.

Q.77. Which treatment should be given to the patient suffering from filariasis?

Ans: Diethylcarbamazine 100 mg twice a day for 3 weeks and for 5 days every six months should be given to the patient.

Q.78. State control measures to prevent filariasis.

Ans: Following are the important measures to control or eliminate filariasis:

- i) Avoid stagnation of water in and around residential areas.
- ii) Use of mosquito nets, mosquito repellents.
- iii) Spraying of insecticides in ditches, drainage areas and swamps, etc.
- iv) Doors and windows should be provided with wire mesh to prevent the entry of mosquitoes.

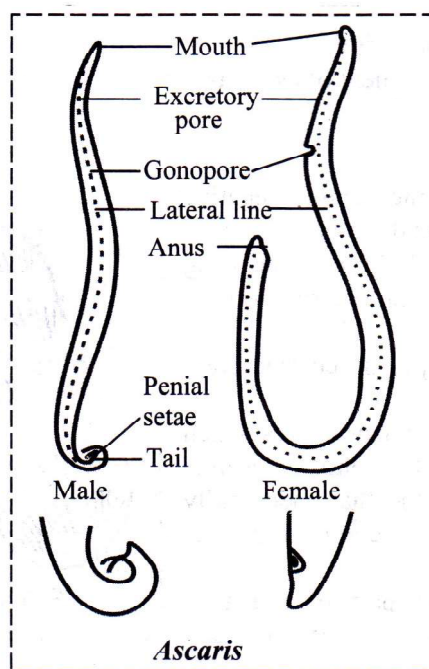
Ascariasis

Q.79. Write a short note on Ascariasis.

- Ans:** i) Disease caused by *Ascaris lumbricoides*.
 ii) It is transmitted by vector like cockroach and flies.
 iii) It is characterised by weakness, anaemia, diarrhea, vomiting etc.
 iv) There is no intermediate host of the parasite, so man get infection by directly ingesting food and water contaminated with infective eggs. It is more common in the children.

Q.80. Describe the external structure of Ascaris.

- Ans:** i) *Ascaris* is a nematode worm.
 ii) Body of *Ascaris* is slender, almost featureless externally.
 iii) Body is tapering at both the ends.
 iv) Body is covered with cuticle secreted by cellular epidermis.
 v) *Ascaris* has a terminal anterior mouth and subterminal posterior anus



Q.81. Sketch and label the diagram of Ascaris.

Ans: Refer Q. 80.

Q.82. Explain the life cycle of ascaris.

- Ans:** i) The life cycle of ascaris involves only one host i.e. man.
 ii) It is present in gastrointestinal tract and faecal matter. Adult worms live in the lumen of the small intestine.
 iii) Ingestion of infective eggs from contaminated vegetables and water is the primary route of infection. A female worm may produce approximately 200,000 eggs per day, which are passed with the faeces.
 v) Unfertilized eggs may be ingested but are not infective.
 vi) Fertile eggs develop into embryo and become infective after 18 days to several weeks depending on the environmental conditions (optimum: moist, warm, shaded soil).
 vii) After infective eggs are swallowed the larvae hatch and, invade the intestinal mucosa, and are carried via circulation to lymphatics and the lungs.
 viii) The larvae mature further in the lungs (10 to 14 days), penetrate the alveolar walls, ascend the respiratory tract to the throat, and are swallowed. Upon reaching the small intestine, they develop into adult worms.
 ix) Two-three months are required from ingestion of the infective eggs to oviposition by the adult female. Adult worms can live for 1 to 2 years.
 x) First appearance of eggs in stools is after 60-70 days. In larval ascariasis, symptoms occur 4-16 days after infection.

Q.83. What are the symptoms of ascariasis ?

Ans: Symptoms of ascariasis include:

- i) Gastrointestinal discomfort, vomiting, fever, and observation of live worms in stools.
- ii) Some patients may have pulmonary symptoms or neurological disorders during migration of the larvae.
- iii) Impaired digestion, diarrhea and vomiting.
- iv) Blockage of the intestinal passage cause abdominal discomfort like colic pain.

Q.84. What are the preventive measures for ascariasis?

- Ans:**
- i) Food dropped on the floor should never be eaten without washing or cooking, particularly in endemic areas
 - ii) Vegetable should be thoroughly washed and boiled before consumption.
 - iii) Finger nails should be regularly cut to avoid accumulation of eggs of ascaris below them.
 - iv) Hand should be properly soap-washed before eating.
 - v) Safe disposal of human excreta.

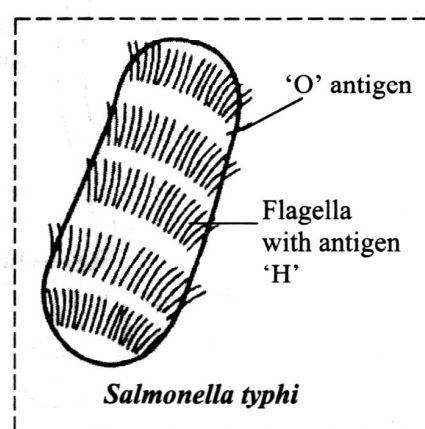
Q.85. Which drugs are used in the treatment of ascariasis?

Ans: Mebendazole and Albendazole are used in the treatment of ascariasis.

Typhoid

Q.86. Describe the structure of *Salmonella typhi*.

- Ans:**
- i) *Salmonella typhimurium* is a pathogenic gram negative bacteria predominantly found in the intestinal lumen.
 - ii) Its pathogenicity is due to an outer" membrane consisting largely of lipopolysaccharides (LPS) which protect the bacteria from the environment.
 - iii) The LPS is made up of an a-antigen, a polysaccharide core, and lipid A.
 - iv) Lipid A is made up of two phosphorylated glucosamines which are attached to fatty acids. These phosphate groups determine bacterial toxicity. Animals carry an enzyme that specifically removes these phosphate groups in an attempt to protect themselves from these pathogens.
 - v) The O-antigen, being on the outermost part of the LPS complex is responsible for the host immune response and makes it difficult for antibodies to recognize.



Q.87. Sketch and label the diagram of *Salmonella typhi*.

Ans: Refer Q. 86.

Q.88. State the symptoms of typhoid.

[Mar 09]

- Ans:**
- i) Characteristic symptom is slowly progressing fever as high as 40°C or 104° F.
 - ii) Headache, general weakness is common among the patients.
 - iii) Abdominal pain with either constipation or diarrhoea.
 - iv) Leukopenia, eosinopenia and relative lymphocytosis is observed.
 - v) Bradycardia (slow heart rate) in 1st week of infection
 - vi) In some cases in 2nd week a rash of flat, rose coloured spots called "rose spots" appears on the front of the chest.
 - vii) Ulceration of intestine, lesion of intestinal mucosa and haemorrhage, delusion and confusion are also possible in 3rd week.

Q.89. Write the modes of transmission of typhoid.

- Ans:**
- i) Typhoid is transmitted by typhoid bacilli through faeco-oral route or urine-oral route.
 - ii) Ingestion of contaminated food, water causes infection in susceptible individuals.
 - iii) Vectors like houseflies can also carry these bacilli and contaminate food or water.
 - iv) Outbreak of typhoid epidemic takes place if there is food contamination by carrier person or if food handler is carrier of typhoid bacilli.
 - v) Chronic carriers can spread bacilli for many years.

Q.90. By which test typhoid fever can be confirmed?

Ans: By 'Widal test' typhoid fever can be confirmed.

Q.91. Write a note on preventive measures for typhoid.

Ans: Preventive measures for typhoid:

- i) **Control of sanitation and water supply :** Purification of drinking water, improvement in sanitation, food hygiene are measures to avoid infection.
- ii) **Control of reservoir :** As typhoid is infectious, the patient should be isolated and transferred to a hospital for proper treatment. Stool and urine of patients are the main source of infection, hence should be disposed of properly.
- iii) **Immunization :** It is recommended to those living in endemic areas and groups at risk of infection such as school children, hospital staff, etc.
- iv) Carriers are the ultimate source of typhoid fever, they should be prevented from handling food, water and milk. The food must be covered by a net to avoid contamination by flies.

Q.92. Describe the causative agent, mode of transmission and symptoms of typhoid.

Ans: *Salmonella typhimurium* is the causative agent of typhoid. For transmission and symptoms Refer Q. 89 and 88.

Q.93. Describe modes of transmission and pathogenicity of amoebiasis and Typhoid.

Ans: Refer Q. 53 and 89 for modes of transmission of amoebiasis and typhoid.

- i) Pathogenicity is the ability of an organism to enter a host and cause a disease.
- ii) Infection of amoebiasis is caused by *Entamoeba histolytica*.
- iii) Infection spreads through ingestion of cyst form of the parasite. Because the cysts are very resistant to certain chemicals and have been known to survive upto seventy-two hours in chlorine solution routinely used in public water supplies.
- iv) In case of typhoid pathogenicity of an organism *Salmonella typhimurium* is due to an outer membrane consisting largely of lipopolysaccharides which protect the bacteria from the environment.

Q.94. Name the vaccines against typhoid.

Ans: There are two vaccines for the prevention of typhoid:

- i) live, oral- Ty21 a vaccine (sold as Vivotif Berna)
- ii) Injectable Typhoid polysaccharide vaccine (sold as Typhim Vi by Sanofi Pasteur and Typherix by Glaxo Smith Kline).

Pneumonia

Q.95. What is pneumonia ?

Ans: Pneumonia is an inflammatory lung disease caused by *Streptococcus pneumoniae* or *Diplococcus pneumoniae* and *Haemophilus influenzae*.

Q.96. Which are the bacteria or factors responsible for causing pneumonia in humans?

- Ans:**
- i) *Streptococcus pneumoniae* and *Haemophilus influenzae* are the bacteria causing pneumonia in humans.
 - ii) Chemical burns or physical injury to the lungs can cause pneumonia.
 - iii) Viruses like influenza virus, RSV, adenovirus and parainfluenza also causes viral pneumonia ..

Q.97. Which body part of human is infected by bacteria causing pneumonia ?

Ans: Alveoli of the lungs are infected by bacteria causing pneumonia.

Q.98. What are the symptoms of pneumonia?

Ans: Symptoms of pneumonia:

- i) Cough producing greenish or yellow sputum accompanied by shaking chills.
- ii) Accumulation of mucous fluid in alveoli and bronchioles.
- iii) High fever, chest pain.
- iv) Breathing becomes difficult.
- v) Pulse rate, respiratory rate and cough increases.
- vi) Loss of appetite, nausea, vomiting, mood swings, joint pains.
- vii) Headache, sweaty and clammy skin, loss of appetite, fatigue, joint pain, vomiting are less frequent symptoms.

Q.99. Write a note on pneumonia.

- Ans:**
- i) Pneumonia is a serious lung disease caused by *Streptococcus pneumoniae* or *Diplococcus pneumoniae* and *Haemophilus influenzae*.
 - ii) Pneumonia is disease that occurs in all age groups.
 - iii) Viral pneumonia is caused by viruses such as influenza virus, RSV, adeno virus and parainfluenza.

- iv) High fever, chest pain, increase in pulse rate, respiratory rate and cough, Loss of appetite, nausea, vomiting, mood swings, joint pains are the symptoms of pneumonia
- v) Vaccination is important for preventing pneumonia in both children and adults.

Q.100. Which treatment should be given to influenza patients ?

Ans: Amantadine, rimantadine, zanamivir and oseltamivir help to prevent influenza. Common Cold

Q.101. What is the causative agent of common cold ?

Ans: Common cold is caused by coronaviruses or rhinoviruses.

Q.102. What are the symptoms of common cold ?

Ans: It involves following symptoms:

- i) Runny nose, nasal congestion, sneezing, sore throat, hoarseness, cough, tiredness.
- ii) Head ache and slight fever accompanied by conjunctivitis, muscle ache.

Q.103. What is the mode of transmission of common cold ?

Ans: It spreads through tiny air droplets that are released when the sick person sneezes, cough or blow the nose.

Q.104. How can common cold be prevented ?

Ans: Common cold can be prevented by taking the following precautions:

- i) Wash hands regularly to remove cold viruses from the skin.
- ii) Alcohol based sanitizers provide very little protection against upper respiratory infections, especially among children.
- iii) Avoid using any item that infected persons may have used.
- iv) Mouth should be covered with handkerchief while coughing and sneezing.
- v) Best prevention is staying away from the people who are infected. Ringworm

Q.105. What is Ringworm ?

Ans: Ring worm is a contagious fungus infection that can affect scalp, body parts, feet and nails. It is also called *Tinea*. Due to appearance of a red ring on the body it is called ring worm. It has nothing to do with worms.

Q.106. What is dermatophytosis ?

Ans: Dermatophytosis is a clinical condition caused by fungal infection of the skin in humans, pets such as cats and domesticated animals.

Q.107. What is the causative agent of ringworm ?

Ans: Dermatophytes of the genera *Trichophyton* and *Microsporum* are the most common causative agent.

Q.108. How do people get Ringworm ?

- Ans:**
- i) Ringworm is spread by either direct or indirect contact.
 - ii) People can get ringworm by direct skin to skin contact with an infected person or pet.
 - iii) People can also get ringworm indirectly by contact with objects of an infected person or pet such as hats, combs, brushes, bed linens, stuffed animals, telephone, gym mats and shower stalls.

Q.109. What are the sign and symptoms of Ringworm ?

- Ans:**
- i) Ringworm of the body shows a flat round patch anywhere on the skin except for scalp and feet.
 - ii) The groin is a common area of infection. As the rash gradually expands, it appears like a ring. The area sometimes becomes itchy.
 - iii) Ringworm of foot is also called athlete's foot. It appears as a scaling or cracking of the skin especially between the toes.
 - iv) Ringworm of the nails causes the affected nails to become thicker, discoloured and brittle or to become chalky and disintegrate.

Q.110. How a Ringworm can be prevented ?

Ans: Ringworm is difficult to prevent. The fungus is very common and it is contagious even before symptoms appear.

Following steps should be followed to prevent infection :

- i) Avoid sharing clothes, sports equipments, towels or sheets.
- ii) Keep common use areas clean, especially in school, day care centres, gyms and locker rooms. Disinfect sleeping mats and gym mats after each use. Do not share clothing towels, hair brushes or other personal items.
- iii) Washing clothes in hot water with fungicidal soap after suspected exposure to ringworm.
- iv) Avoid walking barefooted.

Q.111. Write a note on ringworm.

- Ans:**
- Ringworm of Dermatophytosis is a clinical condition caused by fungal infection of the skin in humans, pets such as cats, and domesticated animals such as sheep and cattle.
 - The term "ringworm" is a misnomer, since the condition is caused by fungi of several different species and not by parasitic worms.
 - The fungi that cause parasitic infections (dermatophytes) feed on keratin, the material found in the outer layer of skin, hair, and nails. These fungi thrive on skin that is warm and moist, but may also survive directly on the outside of hair shafts or in their interiors.
 - In pets, the fungus responsible for the disease survives in skin and on the outer surface of hairs.
 - Ringworm of the body shows a flat round patch anywhere on the skin except for scalp and feet.

Miscellaneous**Q.112. How does the transmission of each of the following diseases take place?**

- | | |
|---------------|--------------|
| a) Amoebiasis | b) Malaria |
| c) Ascariasis | d) Pneumonia |

Ans:

	Name of Disease	Mode of Transmission
a.	Amoebiasis	The pathogen enters large intestine by contaminated food and drinking water and fecal matter are main sources of infection. Housefly acts as vector.
b.	Malaria	It spreads by the bite of an infected female Anopheles mosquito. It multiplies in liver and release haemozoin to cause chill and high fever.
c.	Ascariasis	It is caused by roundworm. Eggs in faeces contaminate soil, water, food, plants, etc. So infection occurs by contaminated water, vegetable, fruits, etc.
d.	Pneumonia	A healthy person inhales droplets or aerosols released by infected person. It may spread by sharing glasses and utensils with an infected person.

13.4 : Cancer and AIDS**Cancer****Q.113. Define cancer and state its characteristics.**

Ans: An uncontrolled growth and multiplication of cells resulting into harmful tumour is called cancer.

Characteristics of cancer :

- Uncontrolled cell division along with abnormal growth of cells.
- Ability to invade the adjacent tissues and even distant organs.
- Loss of cell differentiation.
- Formation of tumour by cancer cells.
- Interference with the normal body functions which may result in death.

Q.114. Define angiogenesis.

Ans: It is process in which cell manages to divide and grow making new blood vessels to feed itself.

Q.115. Define oncologist.

Ans: Physician and researchers who specializes in the study, diagnosis, treatment and prevention of cancer.

Q.116. Explain the types of Cancer.

Ans: On the basis of embryonic origin of the tissue from which the tumour is derived, cancer is classified as follows :

i) Carcinomas :

These are the cancers of epithelial tissue.

They arise from endodermal or exodermal tissues such as skin or the epithelial lining of internal organs and glands.

Majority of cancers of the skin, colon, breast, prostate, lung, etc. are carcinomas.

ii) Sarcoma :

These are the cancers that arise from mesodermal connective tissues and muscles. e.g. bone cancer

(osteosarcoma), cartilage cancer (chondrosarcoma) and tumours in the skeletal muscles (Rhabdomyosarcoma), etc.

iii) Lymphomas :

The cancers that arise from lymphoid tissue are called lymphomas. In lymphomas, there is an excessive production of lymphocytes by lymph nodes and spleen.

iv) Leukemia :

Leukemia or blood cancer develops from haematopoietic cells present in the bone marrow. It is characterised by very high increase in number of poorly differentiated leucocytes and subsequent decrease in erythrocytes.

v) Adenoma :

Adenomas are cancers that arise in the thyroid, the pituitary gland, the adrenal gland, and other glandular tissues.

Q.117.Explain the term metastasis.

- Ans:** i) The cancerous cells of malignant tumour initially show slow growth called latent stage, but later their growth becomes very rapid causing over-crowding and damage to the normal cells.
 ii) This phase of secondary rapid growth of cancer cells is called metastasis.
 iii) In this, the cancer extends to the neighbouring tissues like the roots of a tree.
 iv) Small pieces of primary tumour break off and are carried to other parts of the body by the blood or lymph, where these form the secondary tumours.

Q.118.What are the early warning sign of cancer ?

OR

What are the symptoms of Cancer?

Ans: Symptoms of cancer :

- i) Cancer symptoms are quite varied and depend on where the cancer is located, where it has spread, and how big the tumor is.
 ii) Some cancers can be felt or seen through the skin - a lump on the breast or testicle can be an indicator of cancer in those locations.
 iii) Skin cancer (melanoma) is often noted by a change in a wart or mole on the skin. Some oral cancers present white patches inside the mouth or white spots on the tongue.
 iv) Vertigo, headache, seizures if cancer affects the brain.
 vi) Coughing and shortness of breath if lungs are affected due to cancer.

Q.119.How is a cancerous cell different from a normal cell?

Ans: Cancer cells can be differentiated from normal cells in the following manner :

No.	Cancer Cells	Normal Cells
i)	They divide in an unregulated/uncontrolled manner.	They divide in a regulated manner.
ii)	Cancer cells have a longer life span.	Normal cells have a definite life span.
iii)	The cells do not respond to control mechanisms.	These live in a complex interdependent manner.
iv)	They do not show contact inhibition.	They show the phenomenon of contact inhibition.

Q.120.Write a note on treatment of cancer.

Ans:Treatment of Cancer :

Cancer if detected in early stages can be cured by following treatments :

- i) Cancer treatment depends on type of cancer, stage of cancer, age, health status.
 ii) Cancer if detected in early stages can be cured by following treatments. Surgery, Radiation Therapy, Chemotherapy, Immunotherapy.
 iii) Combination of these therapies is used for treatment.

Q.121. Write a note on cancer.

- Ans:**
- Cancer is a class of disease characterized by out of control cell growth.
 - Cancer harms the body when damaged cells divide uncontrollably to form lumps or masses of tissue called tumors.
 - Tumors can grow and interfere with the digestive, nervous, and circulatory systems and they can release hormones that alter body function. Tumors that stay in one spot and demonstrate limited growth are generally considered to be benign.
 - There are five types of cancers: Carcinoma, leukemia, adenoma lymphoma and sarcoma.
 - Treatment is combination of surgery, radiation and chemotherapy.

AIDS**Q.122. Name the disorder in which the immune mechanism of the body of the patient gets suppressed.**

Ans: AIDS.

Q.123. Which is the causative organism of AIDS ?

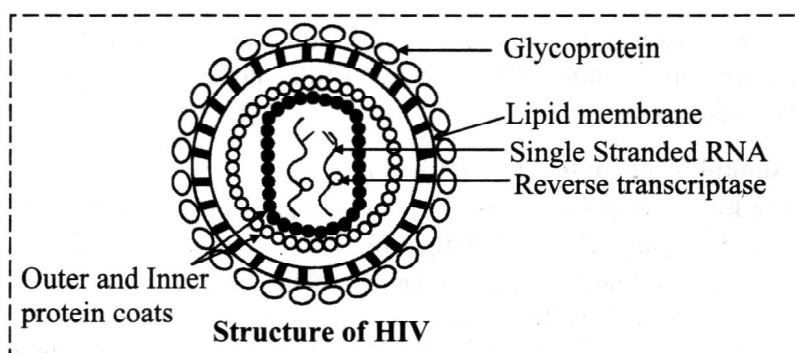
Ans: HIV virus is the causative agent/organism for AIDS.

Q.124. When was AIDS first identified ?

Ans: AIDS was first identified in USA in 1981.

Q.125. Sketch and label the diagram of HIV/AIDS virus.

Ans:

**Q.126. What are the various routes by which transmission of human immuno deficiency virus takes place?**

OR

Write the modes of transmission of AIDS.

Ans: Modes of transmission of AIDS :

- Sexual contact :**
HIV is transmitted from an infected person to healthy person due to multiple sex partners, prostitution and homosexuality.
- Blood contact :**
HIV is transmitted through blood to blood contact as in transfusion of unscreened blood.
- Unsterilized medical instruments/infected organs :**
Use of contaminated needles, syringes and surgical instruments transmit HIV. Accidental needle injury, artificial insemination with infected donated semen and organ transplantation with infected organ can be also a mode of transmission of AIDS.
- Maternal-foetal transmission/mother-to-child transmission :**
Infected mother can transmit HIV to foetus through placenta or to the newborn through contamination with maternal blood, infected amniotic fluid or breast milk.

Q.127. Name the term for the transmission of HIV from pregnant mother to foetus. [Mar 2013]

Ans: Transplacental is the term for transmission of HIV from pregnant mother to foetus.

Q.128. Describe preventive measures against AIDS.

Ans: Preventive measures of slim disease (AIDS) :

- Indiscriminate sexual contact must be avoided.

- ii) Use condom during sexual contact.
- iii) Sharing of needles and syringes should be avoided.
- iv) HIV positive woman should avoid, pregnancy.
- v) Blood should be checked thoroughly before transfusion.
- vi) Mass media should be used for spreading the AIDS awareness.

Q.129. Write a note on AIDS.

Ans: i) HIV virus is the causative organism for AIDS.

- ii) AIDS begins with HIV infection. People infected with HIV may have no symptoms for 10 years or longer, but they can still transmit the infection to other during this symptom-free period. If the infection is not detected and treated, the immune system gradually weakens and AIDS develops.
- iii) Acute HIV infection progresses over time (usually a few weeks to months) to asymptomatic HIV infection (no symptoms) and then to early symptomatic HIV infection with CD₄ T-cell count below 200 cells/mm³.
- iv) Almost all people infected with HIV, if not treated, will develop AIDS. A small group of patients develop AIDS very slowly, or never at all. These patients are called nonprogressors, and many seem to have a genetic difference that prevents the virus from damaging their immune system.
- v) The symptoms of AIDS are primarily the result of infections that do not normally develop in individuals with healthy immune systems. These are called opportunistic infections.
- vi) People with AIDS have had their immune system damaged by HIV and are very susceptible to these opportunistic infections. Common symptoms are: Chills, Fever, Sweat (particularly at night), Swollen lymph glands, weakness and weight loss.

Q.130. Which treatment should be given to AIDS patients?

- Ans:** i) There is no cure for AIDS at present however some treatments are available to improve quality of life for those who have already developed symptoms.
- ii) Antiretroviral therapy suppresses the replication of the HIV virus in the body. A combination of several antiretroviral drugs, called highly active antiretroviral therapy (HAART), has been very effective in reducing the number of HIV particles in the blood stream. This is measured by the viral load (how much virus is found in the blood).
 - iii) Preventing the virus from replicating can improve T-cell count and help the immune system to recover from the HIV infection.

13.5: Adolescence and Drug / alcohol abuse

Q.131. What does 'adolescence' means?

Ans: Adolescence is the period of rapid growth and transition between childhood and adulthood.

Q.132. What causes adolescent substance abuse ?

Ans: Following are the causes of adolescent drug abuse:

- i) Insufficient parental supervision and monitoring
- ii) Lack of communication and interaction between parents and kids
- iii) Poorly defined and poorly communicated rules and expectations against drug use
- iv) Inconsistent and excessively severe discipline
- v) Family conflict
- vi) Favorable parental attitudes toward adolescent alcohol and drug use, and parental alcoholism or drug use.

Q.133. Give the characteristic of adolescence.

- Ans:** i) Adolescence is the period of rapid growth and transition between childhood and adulthood.
- ii) Rapid physical and mental development takes place during this period owing to which child attains sexual maturity.
 - iii) Adolescent period is between the age of 13 to 19 years.
 - iv) During this period there is a great change in the neuro-endocrine system besides excess flow of sex hormones.

- v) Due to this hormonal change there is frequent mood swings and emotional disturbance.
- vi) The accelerated physical growth and development of reproductive organs are major changes during adolescence.
- vii) There are many problems such as facial acne, psychological disorders, physical discomforts, etc. which are associated with adolescence.

Q.134. In your view, what motivates youngsters to take alcohol or drugs and how can this be avoided ?

Ans: Motivation : The youngsters at age of puberty are vulnerable to mental and psychological development. The curiosity, excitement, experimentation and adventure are main causes for motivation of youngsters to take alcohol or drugs.

Natural Curiosity : It motivates them to take alcohol or drugs for experimentation but they do not get rid of it. Stress of examination may be one reason to escape. Internet, movies, media expose them to drugs and alcohol abuse.

Prevention and Control : The parents and teachers may help the alcohol/drug addicts. They may take the help of good friends, professionals and doctors also. Education and counselling are the ways to face the problems and to guide the youths properly about addiction. Tell them the harmful effects of use of alcohol and drugs.

Drugs and Alcohol Abuse :

Q.135. Define the Opioids.

Ans: Opioids: Opioids are the drugs which bind to specific opioid receptors present in CNS or gastrointestinal tract.

Q.136. What is the source of 'Charas'?

Ans: 'Cannabis Sativa' is the source of Charas.

Q.137. List the most common warning signs of drug and alcohol abuse among youths.

- Ans:**
- i) Drop in academic performance.
 - ii) Unexplained absence from his/her college/school.
 - iii) Depression.
 - iv) Isolation or aggressiveness.
 - v) Loss of interest in his/her hobbies.

Q.138. Write a note on drugs and their types.

Ans: There are three major types as : opioids, cannabinoids and coca alkaloids.

- i) **Cannabinoids :** It is a drug producing plant. It is derived from hemp plant.

Derivatives of *Cannabis indica* :

- a) **Bhang :** Obtained from dry leaves.
- b) **Ganja :** Obtained from small leaves and inflorescence.
- c) **Charas :** Obtained from flowering, tops of female plants.
- d) **Marijuana:** It is obtained from *Cannabis sativa*.

All these drugs affect the cardiovascular system.

- ii) **Opioids :**

These drugs suppress brain activity (narcosis) and relieve pain (analgesic). They are the most powerful pain killers. Some examples of opiate narcotics are given below:

Opium : An extract from unripe capsules of poppy plant *Papaver somniferum*. Its addiction leads to loss of weight, fertility and interest in work. Overdose leads to respiratory arrest and death. **Heroin (diacetyl morphine or diamorphine):** It is obtained from morphine by acetylation. It is highly addictive and slows down respiration, heart beat and gastrointestinal activity and induces sleep.

- iii) **Cocaine:** A white crystalline alkaloid extracted from the leaves of coca plant (*Erythroxylum coca*). Its prolonged and high doses cause depression, anxiety, irritability, etc.

Amphetamine: It is a synthetic drug which is a strong stimulant. It leads to wakefulness and mental alertness. It is commonly used by truck drivers and night workers to keep them awake.

- iv) Sedatives reduce tension, anxiety and give a feeling of calmness, relaxation or drowsiness in the body.e.g. **Barbiturates** (sleeping pills). Benzodiazepines lower anxiety and tension without inducing sleep.

Q.139. Write the source? Effect of following drugs on human body.

- i) Morphine ii) Cocaine iii) Marijuana

Ans:i) Morphine : Obtained from latex of Poppy plant called *Papaver somniferum*. It acts as a depressant. It affects the body functions by slowing down them.

ii) **Cocaine :** Coca alkaloid obtained from coca plant - *Erythroxylon coca* interferes with the transport of neurotransmitter - dopamine. It affects CNS also.

iii) **Marijuana :** Obtained from *Cannabis sativa*. It affects cardio vascular system of human's body.

Q.140. What are cannabinoids? Explain.

Ans:Cannabinoids : These are chemicals that interact with Cannabinoid receptors found in brain. The source of natural cannabinoid is the plant *Cannabis sativa*. From this plant Marijuana or marihuana, ganja, charas and hashish are obtained and all affect cardiovascular system in body of humans.

Q.141. Give reason "Drug addiction is a social stigma".

- Ans:i)** Drugs are of several types. All these drugs if abused, can cause various physical and mental problems.
 ii) Psychotropic drugs cause mood alteration and change in the feelings and behaviour. Psychodelic drugs cause delusions and hallucinations.
 iii) Overdose and abuse of drugs can cause respiratory arrest and death.
 iv) An addict loses interest in work, his personal and family life.
 v) An addict can commit crimes if he needs money to buy drugs. Addiction is the sign of mental ill health.
 vi) Drug addicts become a burden on the society and can cause menace and harm to others. Therefore drug addiction is called a social stigma.

Q.142. List the harmful effects caused by drug abuse.

Ans: Various harmful effects of drug abuse :

- i) Restless behaviour, vandalism and violence.
 ii) Coma and death due to respiratory failure in some cases (excessive use of drug/alcohol).
 iii) A combination of drugs + alcohol cause severe effects and even death.
 iv) Mental and financial distress.
 v) Can acquire serious infections like AIDS by use of infected needles and syringes.
 vi) Liver cirrhosis by use of excessive alcohol.
 vii) In pregnancy the foetus may be affected.
 viii) Misuse in sports.

Q.143. Do you think that friends can influence one to take alcohol/drugs? If yes, how may one protect himself/herself from such an influence?

Ans: One of the reasons for alcohol drinking or drug abuse is peer pressure. So one can be easily influenced by one's friends to take alcohol or drugs. So one must avoid undue peer pressure with one's own will power or may seek the help of one's parent and teachers.

Q.144. Why is that once a person starts taking alcohol or drugs, it is difficult to get rid of this habit ?

- Ans:i)** Initially, one may be motivated to take alcohol or drugs by many causes like peer pressure, liking of taste, desire for excitement, advertisement, false belief of enhanced performance, etc.
 ii) The regular consumption of alcohol or drug develops dependency on it called addiction. Then if alcohol or drug is not available to an addict, then he/she start showing certain unpleasant characteristics called withdrawal symptoms.

Q.145. Explain the ill effects of opioids and cannabinoids on health.

OR

Give the adverse effects of opioids, cannabinoids, and morphines on human health. [Mar 2013]

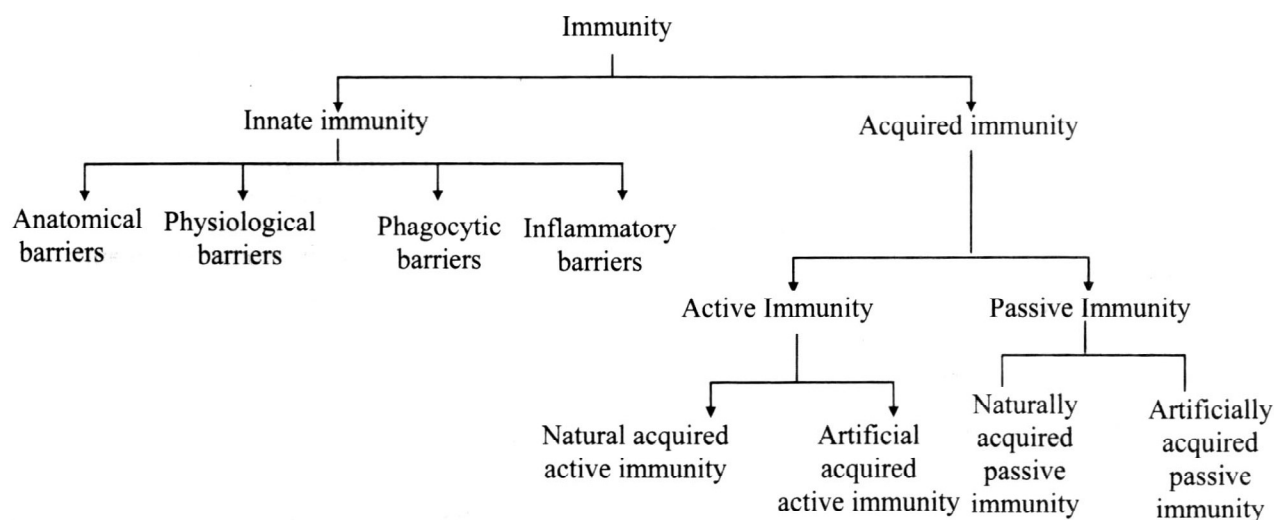
- Ans:i)** Opioids interact with the receptors present in our CNS and gastrointestinal track. Heroin is a depressant and slow down the body function
 ii) Cannabinoids interact with the receptors present in the brain. Inhalation and ingestion of these

substances has effect on cardiovascular system of the body. Cannabinoids like LSD causes hallucinations.

- iii) Morphine is very effective sedative and painkiller and used for patients who have undergone surgery but it can cause addiction.

Quick Review

Types of Immunity



No.	Disease	Causal organism	Symptoms
i.	Typhoid	<i>Salmonella typhi</i>	Sustained high fever, weakness, stomach pain, constipation, headache and loss of appetite.
ii.	Pneumonia	<i>Streptococcus pneumoniae</i>	Fever, chills, cough, headache, breathlessness
iii.	Malaria	<i>Plasmodium vivax</i> <i>Plasmodium malariae</i> <i>Plasmodium falciparum</i> <i>Plasmodium ovalae</i>	Chilliness and shivering, headache, rapid increase in body temperature.
iv.	Amoebiasis	<i>Entamoeba histolytica</i>	Constipation, abdominal pain and cramps, stools with excess mucous and blood clots.
v.	Ascariasis	<i>Ascaris lumbricoides</i>	Internal bleeding, muscular pain, fever, anemia and blockage of intestinal passage.
vi.	Elephantiasis /filariasis	<i>Wuchereria bancrofti</i> <i>Wuchereria malayi</i>	Chronic inflammation of organs, edema of body parts such as legs and genital organs.
vii.	Ringworm	Fungi – Microsporum, Trichophyton, Epidermophyton	Appearance of dry, scaly lesions on different body parts like skin, scalp and nails, etc.
viii.	Common cold	Rhino Viruses	Nasal Congestion and discharge, sore throat, hoarseness, cough, headache, tiredness, etc.

Multiple Choice Questions

1. Disease is a condition in which
 - a) functions are disturbed
 - b) functions are stopped
 - c) functions are derranged
 - d) both a) and c)
2. T-lymphocytes mature in
 - a) thymus
 - b) thyroid
 - c) liver
 - d) spleen
3. _____ is an anatomical barrier.
 - a) Saliva
 - b) Lysozyme
 - c) Interferon
 - d) Mucus
4. Mucous membrane trapping the microbes acts as a _____. **[Mar 2014]**
 - a) physiological barrier
 - b) physical barrier
 - c) phagocytic barrier
 - d) inflammatory barrier
5. Antibodies fight against
 - a) infection
 - b) thirst
 - c) starvation
 - d) stress
6. Antibody is
 - a) a substance that specifically inactivates an antigen
 - b) phagocyte that feeds on invading pathogen
 - c) cellular component of blood
 - d) secretion of RBC
7. Study of interaction of antigen and antibody in blood is
 - a) Hematology
 - b) Serology
 - c) Cryology
 - d) Antilogy
8. Antigens are found
 - a) inside cytoplasm
 - b) inside nucleus
 - c) on nuclear envelope
 - d) on cell surface
9. Antiserum has
 - a) antigen
 - b) antibody
 - c) WBC
 - d) RBC
10. Passive immunity is
 - a) acquired through natural overt or latent infection
 - b) acquired through vaccination
 - c) acquired through ready-made antibodies
 - d) acquired by activating immune system of the body
11. Antigenic determinants of an antigen that are recognized by antibody are
 - a) Paratopes
 - b) Epitopes
 - c) Isotopes
 - d) Nondeterminants
12. Innate immunity is provided by
 - a) phagocytes
 - b) antibodies
 - c) T-Lymphocytes
 - d) B-Lymphocytes
13. The cells active in production of antibodies are
 - a) Kupffer cells
 - b) plasma cells
 - c) mast cells
 - d) Langerhans cells
14. Antibodies are
 - a) glycoproteins
 - b) carbohydrates
 - c) lipids
 - d) nucleic acids
15. Antibody producing plasma cells are derived from
 - a) memory T-cells
 - b) suppressor T-cells
 - c) Helper T-cells
 - d) B-lymphocytes
16. In ABO system of blood groups 'O' stands for
 - a) absence of antigen
 - b) antigen O
 - c) antibody O
 - d) absence of antibodies
17. What will be the parents blood groups if the blood group of a child is AB ? **[Mar 2013]**
 - a) A and O
 - b) Band O
 - c) AB and O
 - d) A and AB
18. A person having blood group 'AB' has **[Mar 2013 old course]**
 - a) antibody b
 - b) antibody a
 - c) no antibody
 - d) both antibody a and b
19. 'Pathogens' are
 - a) substances produced against any disease causative
 - b) chemical substances produced by the host cells to kill the parasite animal
 - c) disease producing agent
 - d) cells which kill the parasites
20. Which form of amoebae die after leaving the body ?
 - a) Cysted trophozoites
 - b) Rhombocytes
 - c) Filariae
 - d) Non encysted trophozoites
21. Following is protozoan disease
 - a) Malaria
 - b) Typhoid
 - c) AIDS
 - d) Cholera

22. Vector host of Malaria is
 a) male culex mosquito
 b) female Anopheles mosquito
 c) Culex mosquito
 d) Aedes mosquito
23. Infectious stage of plasmodium is
 a) Trophozoite b) Sporozoite
 c) Cryptozoite d) Metacercaria
24. Elephantiasis is caused by
 a) *W.bancrofti* b) *P. Vivax*
 c) Bedbug d) Elephant
25. Filaria belongs to
 a) Arthropoda b) Nematode
 c) Chordate d) Mollusca
26. Which disease is caused by nematode ?
 a) Malaria b) Ascariasis
 c) Leprosy d) Amoebiasis
27. Ringworm is ____ disease.
 a) fungal b) bacterial
 c) viral d) nematode
28. Ascariasis is caused by
 a) protozoan b) helminth
 c) bacteria d) fungus
29. Typhoid is caused by
 a) Salmonella b) Plasmodium
 c) Viriola d) Tick
30. Typhoid is characterised by
 a) continuous fever often with delirium
 b) slow pulse
 c) constipation, intestinal ulcers and blood stool.
 d) all of these
31. Bacterial pneumonia is caused by
 a) *Haemophilus influenzae*
 b) *Streptococcus pneumoniae*
 c) *Salmonella typhi*
 d) *Brugia malayi*
32. Common cold is also called as
 a) nasopharyngitis
 b) acute viral rhinopharyngitis
 c) acute coryza
 d) all of the above
33. Dermatophytosis is caused by __ infection.
 a) fungal b) bacterial
 c) viral d) protozoal
34. Leukemia is the
 a) mouth cancer b) lung cancer
 c) blood cancer d) breast cancer
35. Study of Cancer is called
 a) Etiology b) Ecology
 c) Oncology d) Nosology
36. Spread of cancerous cells to distant sites is termed as
 a) metastasis b) oncogenes
 c) proto-oncogenes d) malignant neoplasm
37. Breast cancer is an example of
 a) malignant carcinoma
 b) benign tumour
 c) sarcoma
 d) lymphoma
38. Cancer is induced by
 a) environmental pollutants
 b) UV and other radiations
 c) smoking
 d) all of these
39. The agent that tends to produce cancer is known as
 a) Oncogene b) Carcinoma
 c) Carcinogen d) Metastasis
40. A benign tumour differs from malignant one in that
 a) a benign tumour shows metastasis spread in the body
 b) it presses on neighbouring organs to produce acute pain
 c) it is enveloped within a capsule
 d) all of these
41. Full form of AIDS is
 a) anti-immune deficiency syndrome
 b) auto-immune deficiency syndrome
 c) acquired immune deficiency syndrome
 d) acquired immune disease syndrome
42. AIDS is caused by
 a) fungus b) virus
 c) bacterium d) helminth
43. HIV stands for
 a) Human Immuno deficiency virus
 b) Hindustan institute of virology
 c) High Intensity voltage
 d) None of them
44. AIDS virus spreads in the body through
 a) suppressor T-cells b) carrier T-cells
 c) helper T -cells d) killer T-cells
45. AIDS disease is the result when the concerned virus destroys the victim's
 a) RBCs b) helper T-cells
 c) WBCs d) thrombocytes
46. Adolescence is a age.
 a) sensitive b) mature
 c) both a) and b) d) none of these
47. Opium is derived from [Mar 2013 old course]
 a) Papaver somniferum
 b) Claviceps purpurea
 c) Thea chinensis
 d) Cannabis sativa

48. Cannabis sativa (Hemp) yields
 a) bhang b) charas
 c) ganja d) all of these
49. Charas, hashish, ganja are obtained from [Oct 2013]
 a) *Papaver somniferum*
 b) *Erythroxylum coca*
 c) *Atropa belladonna*
 d) *Cannabis sativa*
50. From the stand point of source of origin odd one out is
 a) Bhang b) heroin
 c) marijuana d) hashish

Answer Keys

1.	d)	2.	a)	3.	d)	4.	b)	5.	a)	6.	a)	7.	b)	8.	d)	9.	b)	10.	c)
11.	b)	12.	a)	13.	b)	14.	a)	15.	d)	16.	a)	17.	d)	18.	c)	19.	c)	20.	d)
21.	a)	22.	b)	23.	b)	24.	a)	25.	b)	26.	b)	27.	a)	28.	b)	29.	a)	30.	d)
31.	b)	32.	d)	33.	a)	34.	c)	35.	c)	36.	a)	37.	a)	38.	d)	39.	c)	40.	c)
41.	c)	42.	b)	43.	a)	44.	c)	45.	b)	46.	a)	47.	a)	48.	d)				
49.	d)	50.	b)																



