

## CHAPTER

# 8

# HUMAN HEALTH AND DISEASE



## Chapter Objectives

This chapter will help you understand :

- **Health and disease** : Introduction; Types of diseases; Communicable diseases (bacterial, viral, protozoan, helminths); Non-communicable diseases (deficiency, degenerative, cancerous, allergy).
- **Immune system** : Introduction; Immunity - Types of immunity (innate and acquired/ active and passive); Vaccination and immunization; Allergy; Autoimmunity.
- **AIDS and Cancer** : Introduction; Causes; Symptoms, Effects; Treatment and prevention.
- **Drug and Alcohol Abuse** : Introduction; Types of drugs – Opioids, Cannabinoids, Cocaine (coca alkaloid); Adolescence and drug/alcohol abuse; Addiction and dependence; Effects of drug and alcohol abuse; Prevention and control.



## TOPIC-1 Health and Disease

### Quick Review

- ❖ **Infection** is the process by which harmful microorganism gains entry into the body and makes ill or causes diseases.
- ❖ **Contamination** refers to the presence of disease causing agents in non-living things like water, food etc.
- ❖ **Infestation** is the presence of an unusually large number of insects or animals in a place, typically so as to cause damage or disease.
- ❖ **Etiology** may be defined as the study of causation of disease or abnormal condition.
- ❖ **Virulence** is the degree of pathogenicity of a pathogen in the host body.
- ❖ **Congenital diseases** are inborn diseases whereas **acquired disease** occur only after birth.
- ❖ **Bacteria causes diarrhoeal diseases** are *E. coli.*, *Shigella sp.*, *Campylobacter* and *Salmonella*.
- ❖ **Laveran (1880)** discovered malarial parasite in blood of malarial patient.
- ❖ **Ronald Ross (1897)** confirmed the discovery of *Plasmodium* and its transmission by *Anopheles (Female)*.
- ❖ There are 5 parasite species that cause malaria in humans, and 2 of these species – *P. falciparum* and *P. vivax* – pose the greatest threat.
- ❖ *P. falciparum* is the **most prevalent malaria parasite** on the African continent. It is responsible for most malaria-related deaths globally.
- ❖ **Athlete's foot** (also called **tinea pedis**) is a fungal infection of the feet. It is characterised by scaling and/or blistering of the soles, fissures of the toe webs, and itching.
- ❖ **Kyasanur forest disease (KFD)** is a viral haemorrhagic fever caused by the infection with flavi virus from small wild animals.
- ❖ In 2005, **Ian Frazer** developed the human papillomavirus vaccine.

#### TOPIC - 1

Health and Disease

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#### TOPIC - 2

Immune System

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AIDS and Cancer

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Drug and Alcohol Abuse

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#### TIPS...

- ✎ Give more emphasis on types of communicable diseases.
- ✎ Your concept should be clear on the life cycle of *Plasmodium sp.* in case of malaria.
- ✎ Try to remember causative organisms and mode of transmission of all the diseases.

#### TRICKS...

- ✎ Make concept maps and tables on types of diseases on the basis of their causative agent.
- ✎ Mode of transmission and symptoms.



severe joint pain. Other symptoms include muscle pain, headache, nausea, fatigue and rash. Whereas housefly is the vector for cholera, cockroach transmit jaundice or yellow fever and is a carrier of food and water borne diseases. Female *Anopheles* is responsible for spreading malaria caused by *Plasmodium* species.

**Q. 7. Many diseases can be diagnosed by observing the symptoms in the patient. Which group of symptoms are indicative of pneumonia?**

- (a) Difficulty in respiration, fever, chills, cough, headache
- (b) Constipation, abdominal pain, cramps, blood clots
- (c) Nasal congestion and discharge, cough, sore throat, headache
- (d) High fever, weakness, stomach pain, loss of appetite and constipation

[NCERT Exemp. Q. 7, Page 52]

**Ans. Correct option : (a)**

**Explanation :** Pneumonia is an infection of lungs which is caused by bacteria, virus, fungi, or parasites. It is a type of chest infection which affects the tiny air sacs (called alveoli) of lungs. In this condition these air sacs get inflamed and fill with fluid which makes it harder to breathe. It is characterised by difficulty in respiration, fever, chills, cough, headache.

Constipation, abdominal pain, cramps, blood clots are the symptoms of amoebiasis, caused by *Entamoeba histolytica*. Common cold or influenzae are characterised by nasal congestion and discharge, cough, sore throat, headache. High fever, weakness, stomach pain, loss of appetite, and constipation are the symptoms of typhoid.

**Q. 8. A person with sickle cell anaemia is**

- (a) more prone to malaria.
- (b) more prone to typhoid.
- (c) less prone to malaria.
- (d) less prone to typhoid.

[NCERT Exemp. Q. 23, Page 55]

**Ans. Correct option : (c)**

**Explanation :** A person with sickle cell anaemia is less prone to malaria because in sickle cell anaemia red blood cells becomes abnormally shaped, if they inherit two faulty copies of the gene for the oxygen-carrying protein haemoglobin. The faulty gene persists because even carrying one copy of it confers some resistance to malaria.

Therefore, people with normal haemoglobin A are susceptible to death from malaria but people with

sickle cell trait who have one gene for haemoglobin A and other for haemoglobin S have a greater chance of surviving malaria and do not suffer adverse consequences from the haemoglobin S gene.

**Q. 9. Haemozoin is**

- (a) a precursor of haemoglobin.
- (b) a toxin from *Streptococcus*.
- (c) a toxin from *Plasmodium* species.
- (d) a toxin from *Haemophilus* species.

[NCERT Exemp. Q. 21, Page 54]

**Ans. Correct option : (c)**

**Explanation :** Haemozoin is a toxin released by *Plasmodium* species, which is responsible for the chill and high fever recurring every three to four days. To continue their life-cycle, *Plasmodium* enters the human body as sporozoites and multiply within the liver cells, resulting in the rupture of the RBCs. The ruptured RBCs is associated with release of a toxic substance, haemozoin.

*Streptococcus* produces streptomycin and streptococcal pyrogenic exotoxin which shows haemolytic condition. *Haemophilus* produces cytolethal distending toxin (HdCDT) which inhibit mammals cell proliferation.

**Q. 10. One of the following is not the causal organism for ringworm.**

- (a) *Microsporium*
- (b) *Trichophyton*
- (c) *Epidermophyton*
- (d) *Macrosporium*

[NCERT Exemp. Q. 22, Page 54]

**Ans. Correct option : (d)**

**Explanation :** Ringworm infections are caused by fungi belonging to the genera *Microsporium*, *Trichophyton*, and *Epidermophyton*.

*Macrosporium* is an ectomycorrhizal zoosporic fungus causing diseases of economically important vascular plants.

**Q. 11. The sporozoites that cause infection when a female *Anopheles* mosquito bites a human being are formed in**

- (a) liver of human.
- (b) RBCs of mosquito.
- (c) salivary glands of mosquito.
- (d) intestine of human.

[NCERT Exemp. Q. 5, Page 51]

**Ans. Correct option: (d)**

**Explanation :** The sporozoites that cause infection, when a female *Anopheles* mosquito bites a person being are formed in intestine of mosquito.



## Very Short Answer Type Questions

(1 or 2 marks each)

**Q. 1. Certain pathogens are tissue/organ specific. Justify the statement with suitable examples.**

[NCERT Exemp. Q. 1, Page 55]

**Ans. (i)** Certain pathogens are tissue/organ specific as they are adapted to overcome the resistance mechanisms of those tissues and organs. [1]

(ii) Example, the pathogens that enter the gut must know a way of surviving in the stomach at low pH and resistant to various digestive enzymes. [1]

**Q. 2. Given below are the pairs of pathogens and the diseases caused by them. Which out of these is not a matching pair and why?**

- (a) Virus - Common cold
- (b) Salmonella - Typhoid

- (c) *Microsporium* - Filariasis
- (d) *Plasmodium* - Malaria

[NCERT Exemp. Q. 4, Page 55]

- Ans. (i) Option (c) is not a matching pair of pathogen and the disease caused by them. [1]
- (ii) Filariasis is a disease caused by nematode, *Wuchereria bancrofti*. It is also called elephantiasis due to excessive enlargement of body parts like legs. Secondary host of filariasis is *Culex* or *Aedes* mosquito. [½]
- (iii) *Microsporium* is a filamentous keratinophilic fungus. It is one of the three genera that cause dermatophytosis. Dermatophytosis is the infection in hair, skin or nails. [½]

Q. 3. Why is it that during changing weather, one is advised to avoid closed, crowded, and air-conditioned places like cinema halls, etc.?

[NCERT Exemp. Q. 11, Page 56]

- Ans. (i) During changing weather, one is advised to avoid crowded places, because changing seasons are the time when infectious agents are more prevalent. [1]
- (ii) Moist condition favours pathogen to grow fast and people are more vulnerable as body system

is busy in adapting the changing environmental conditions of temperature humidity, etc. and they get infected to their pathogen easily. [1]

Q. 4. The harmful allele of sickle cell anaemia has not been eliminated from human population. Such afflicted people derive some other benefit. Discuss. [NCERT Exemp. Q. 12, Page 56]

- Ans. (i) Sickle-cell anaemia still persists in the population in spite of being harmful because this mutation can also be beneficial in certain conditions. The mutant type haemoglobin (Hb<sup>s</sup>) is found at high frequencies (up to 20% and above) in the tropical Africa. [½]
- (ii) It is known that heterozygotes (Hb<sup>s</sup>/Hb<sup>A</sup>), having both types of haemoglobin show resistance to malarial infection because the body targets the *Plasmodium falciparum* infected cell for destruction. [½]
- (iii) In contrast, individuals homozygous for normal haemoglobin (Hb<sup>A</sup>/Hb<sup>A</sup>), suffer high mortality rates in early childhood due to malarial infection. Thus, the allele for sickle cells has been maintained because heterozygotes have a higher reproductive success than either of the two possible homozygotes. [1]

## Short Answer Type Questions

(3 marks each)

Q. 1. "Prevention is better than cure". Comment.

[NCERT Exemp. Q. 4, Page 57]

- Ans. (i) Several diseases and injuries are preventable and can be managed much better if identified earlier on. [½]
- (ii) Prevention is always better than cures because some diseases caused extensive damage to the body tissues or organs. They also have a
- (a) negative effect on their capacity to function.
  - (b) permanent or long-term debilitating effect.
  - (c) negative mental and psychological effect.
  - (d) financial burden.

Prevention, therefore is easier and effective, than cure of a disease. [2½]

Q. 2. The following table shows certain diseases, their causative organisms and symptoms. Fill the gaps.

S. No.	Name of the Disease	Causative organism	Symptoms
(i)	Ascariasis	<i>Ascaris</i>	—
(ii)		<i>Trichophyton</i>	Appearance of dry, scaly lesions on various parts of the body.
(iii)	Typhoid	—	High fever, weakness, headache, stomach pain, constipation.
(iv)	Pneumonia	<i>Streptococcus pneumoniae</i>	—

(v)	—	Rhino viruses	Nasal congestion and discharge, sore throat, cough, headache.
(vi)	Filariasis	—	Inflammation in lower limbs.

[NCERT Exemp. Q. 8, Page 58]

Ans.

S. No.	Diseases	Causative organisms	Symptoms
(i)	Ascariasis	<i>Ascaris</i>	Colic pain, indigestion, diarrhoea, vomiting, weakness, retarded physical or mental efficiency. [1]
(ii)	Ring worm	<i>Trichophyton</i>	Appearance of dry, scaly lesions on various parts of the body. [½]
(iii)	Typhoid	<i>Salmonella typhi</i>	High fever, weakness, headache, stomach pain, constipation. [½]

(iv)	Pneumonia	<i>Streptococcus pneumoniae</i>	Sudden chill, chest pain, cough with rusty mucoid sputum, rapid shallow breathing, and high temperature. [1]
(v)	Common cold	<i>Rhino viruses</i>	Nasal congestion and discharge, sore throat, cough, headache. [½]
(vi)	Filariasis	<i>Wuchereria bancrofti</i>	Inflammation in lower limbs. [½]

Q. 3. Diseases like dysentery, cholera, typhoid, etc., are more common in overcrowded human settlements. Why? [NCERT Exemp. Q. 15, Page 59]

Ans. (i) Dysentery, cholera, and typhoid are more common in crowded settlements because these are infectious diseases and spread from person to person contact. [1]

(ii) Water gets contaminated with the excreta of infected people and causes the spread of infection to other people. [2]

Q. 4. If there are two pathogenic viruses, one with DNA and other with RNA, which would mutate faster? and why? [NCERT Exemp. Q. 23, Page 59]

Ans. (i) Both DNA and RNA are able to mutate. But RNA being unstable and do not have built in proof reading, mutates faster than DNA. Accordingly, viruses having RNA genome and having shorter life span mutate and evolve faster. [2]

(ii) Whereas DNA is more stable and also has better repair mechanisms that correct the changes in base pairs as soon as it is introduced. [1]

Q. 5. Explain any three preventive measures to control microbial infections. [NCERT Exemp. Q. 5, Page 57]

Ans. Preventive measures to control microbial infection are as follows :

(i) Maintenance of personal and public hygiene : It can be done by

(a) proper cleanliness standards and practices.

(b) proper disposal of waste.

(c) periodic cleaning of water reservoirs, etc. [1]

(ii) Control or elimination of vectors that transmit diseases : It can be done by

(a) checking water stagnation and garbage accumulation.

(b) using disinfectants or biological methods to check their breeding and spread. [1]

(iii) Proper immunization by vaccination, wherever available to control or completely eradicate infectious diseases. [1]

Q. 6. "Maintenance of personal and public hygiene is necessary for prevention and control of many infectious diseases". Justify the statement giving suitable examples. [NCERT Exemp. Q. 7, Page 58]

Ans. (i) Infectious diseases are those diseases which are easily transmitted directly or indirectly from one person to another. These are caused by pathogenic microorganism like bacteria, virus, parasites, fungi, etc.

(ii) For prevention and control of such diseases, maintenance of personal and public hygiene is necessary. For this purpose, some common preventive measures should be taken as following :

(a) Education : People should be educated about communicable disease to protect themselves from such diseases.

(b) Isolation : The infected person should be kept isolated to diminish the spread of infection.

(c) Vaccination : Vaccination should be given to peoples on time to avoid infection.

(d) Sanitation : The sanitation should be improved to avoid infection from polluted water, contaminated food, etc. These measures are mainly essential where the infectious agents are transmitted through food and water such as typhoid, amoebiasis, and ascariasis.

(e) Eradication of vectors : The breeding places of vectors must be destroyed and adult vectors should be killed by suitable methods.

(f) Sterilisation : The patient's surroundings and articles of use should be completely sterilised to reduce the chances of infection. [3]

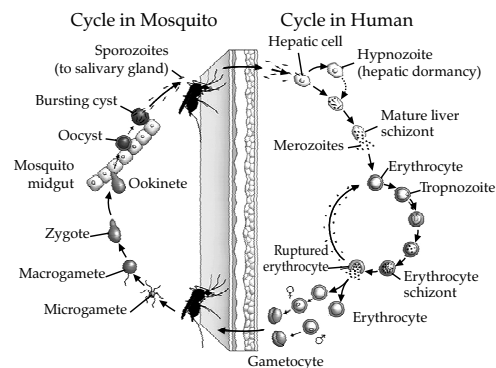
## Long Answer Type Questions

(5 marks each)

Q. 1. Represent schematically the life cycle of a malarial parasite. [NCERT Exemp. Q. 1, Page 59]

Ans. (i) The malaria parasite has a complex, multistage life cycle. It occurs within two living beings - the vector mosquitoes and the vertebrate hosts. [1]

(ii) Schematic representation of the life cycle of a malarial parasite.



[4]

**Q. 2. Compare the life style of people living in the urban areas with those of rural areas and briefly describe how the life style affects their health.**

[NCERT Exemp. Q. 2, Page 59]

**Ans. (i)** Life style of people living in the urban areas with those of rural areas are different. People think that the city life is better than village life. However, there are so many advantages as well as disadvantages of urban life and rural life.

**(ii)** Urban (city) Life :

**(a)** Advantages of urban life :

1. The city life is more comfortable as there are lot of facilities in the city.
2. There are more opportunities for people to progress their lives and for making money.
3. Children can get a good education.
4. When a person falls ill, they will get treatments in a good government and private hospital available in the city.
5. There are large shopping complexes, banks, offices, cinemas, clubs, hospitals, etc., in and around the city for recreations.
6. They have better transport facilities than the village.
7. There is electricity, highway, communication, telecommunication, plumb facilities in the city. So, people can lead a comfortable and enjoyable life in the city. [1½ = Any six]

**(b)** Disadvantages of urban (city) life :

1. Goods are expensive and the cost of living is very high in the city.
2. The environment is polluted with dust, smoke, garbage, and gases from factories, hence no fresh air and pure water.
3. Most of the people who live in the city are corrupted, so there are lots of crimes in the city.

4. Many thefts and murders often take place in the city.
5. The city is always busy and noisy.
6. There are a lot of vehicles and people on the road. The streets are dusty and unclean. So, it is hard to lead a healthy life in the city. [1 = Any four]

**(iii)** Rural (village) life :

**(a)** Advantages of rural life :

1. People of the village live in unity and peace.
2. The villagers earn money enough for live very hardly. So, they live in less competition with each other.
3. Peoples are social and have more friends in the community.
4. They always try to protect their traditional habits and culture.
5. Environment of the village is clean and beautiful. The village has less noise and rush. So, the pollution is less.
6. Due to having very less vehicles, roads are less dangerous for driving or cycling.
7. They can get fresh vegetables and fresh fruits.
8. The environment of the village is pleasant and silent and it has scenic beauty. [1½ = Any six]

**(b)** Disadvantages of Rural (village) :

1. People lack of good education, proper medical facilities, transportation, electricity, telecommunication, etc.
2. Life style affects human health and cause many diseases due to specific food habits, work related posture or exposure to harmful radiation or substances, lack of physical exercise, mental stress, etc.
3. Some life style diseases are common like cancer, alcoholism, heart diseases, etc. [1]



## TOPIC-2

### Immune System

#### Quick Review

- ❖ Spleen is the **largest lymphatic organ of the body**.
- ❖ The science of development of immunity against particular pathogen is called **immunology**.
- ❖ Foundation of **science of immunology** were discovered by **Edward Jenner, Louis Pasteur and Von Behring**.
- ❖ Immunity was defined by **Sir Mac Farlane Burnet**.
- ❖ Types of immunity are **innate, adaptive, and passive**.
- ❖ **Types of immunoglobulin** are IgA (immunoglobulin A), IgD (immunoglobulin D), IgE (immunoglobulin E), IgG (immunoglobulin G), and IgM (immunoglobulin M).
- ❖ **IgG** is the **most abundant immunoglobulin**. It is the only which can pass through the placenta.

#### TIPS...

- ✎ Give more emphasis on immunity.
- ✎ Your concept should be clear on the
  - innate and acquired immunity.
  - active and passive immunity.
- ✎ Don't leave topics like immunoglobulin (antibody), allergies.

#### TRICKS...

- ✎ Make concept maps on immune system and their role.
- ✎ Make difference table on types of immunity, B-cells and T-cells.

- ❖ IgA is the primary immunoglobulin of exocrine secretion.
- ❖ IgM is the **largest and first to reach at the site of infection** being present in circulating fluid.
- ❖ It is the antibody which is **made in greatest amount on foetus**.
- ❖ The ability of the antigen to stimulate antibody formation is called **antigenicity**.
- ❖ Vaccines work by stimulating the immune system to produce antibodies against a foreign invader without actually infecting the individual with the disease.
- ❖ Live attenuated vaccine is **more potent (active) than killed vaccine**.
- ❖ **DiGeorge syndrome (thymic dysplasia)** is a birth defect in which kids are born without a thymus gland. It is an example of a primary T-lymphocyte disease. The thymus gland is where T lymphocytes normally mature.



## Multiple Choice Questions

(1 mark each)

**Q. 1. Which of the following are the reason(s) for Rheumatoid arthritis? Choose the correct option.**

- (i) Lymphocytes become more active.
  - (ii) Body attacks self-cells.
  - (iii) More antibodies are produced in the body.
  - (iv) The ability to differentiate pathogens or foreign molecules from self-cells is lost.
- (a) (i) and (ii)                      (b) (ii) and (iv)  
(c) (iii) and (iv)                    (d) (i) and (iii)

[NCERT Exemp. Q. 11, Page 52]

**Ans. Correct option :** (b)

*Explanation :* Rheumatoid arthritis is an autoimmune disorder. It occurs when immune system mistakenly attacks own body's tissues like, the synovium (the lining of the membranes that surround your joints). The resulting inflammation thickens the synovium, which can eventually destroy the cartilage and bone within the joint. The tendons and ligaments that hold the joint together weaken and stretch. Gradually, the joint loses its shape and alignment.

Autoimmunity is an abnormal immune response in which the immune system of the body starts rejecting its own body cells or 'self-cells and molecules. Sometimes, body lose its ability to differentiate between pathogen or foreign molecules from self-cell and attacks self-cells. This results in damage to the body.

**Q. 2. The substance produced by a cell in viral infection that can protect other cells from further infection is**

- (a) serotonin.                      (b) colostrum.
- (c) interferon.                      (d) histamine.

[NCERT Exemp. Q. 14, Page 53]

**Ans. Correct option :** (c)

*Explanation :* Interferon, belongs to cytokinin, is a protein which enhances the role of immune system. It is produced by virus-infected cells, that inhibit reproduction of the invading virus and induce resistance to further infection. Serotonin is a neurotransmitter that leads to depression. Colostrum is present in the lactating mother's breast milk which contains antibodies to protect the new born

against disease. Histamine is also a neurotransmitter involved in inflammatory response.

**Q. 3. Transplantation of tissues/organs to save certain patients often fails due to rejection of such tissues/organs by the patient. Which type of immune response is responsible for such rejections?**

- (a) Auto-immune response
- (b) Humoral immune response
- (c) Physiological immune response
- (d) Cell-mediated immune response

[NCERT Exemp. Q. 15, Page 53]

**Ans. Correct option :** (d)

*Explanation :* Transplantation is the replacement of a diseased organ or tissue of an individual with healthy organ or tissue of same or another individual. These transplants or graft gets rejected, if it is recognised as foreign antigen by the body's immune systems. Cell mediated immune response, mediated by T-lymphocyte is able to differentiate between self and non-self cells/organ. This type of immune response recognises the body's non-cells or other tissue or organs from other individual as foreign antigen and cause rejection of the graft.

**Q. 4. Antibodies present in colostrum which protect the new born from certain diseases is of**

- (a) Ig G type.                      (b) Ig A type.
- (c) Ig D type.                      (d) Ig E type.

[NCERT Exemp. Q. 16, Page 53]

**Ans. Correct option :** (b)

*Explanation :* Colostrum, a yellowish fluid secreted by mother during the initial days of lactation, has abundant IgA antibodies. It protects infants from several diseases. It is found in saliva and tear also. IgA is the second most human immunoglobulin in serum.

**Q. 5. Anti-venom against snake poison contains**

- (a) antigens.
- (b) antigen-antibody complexes.
- (c) antibodies.
- (d) enzymes.

[NCERT Exemp. Q. 18, Page 54]

**Ans. Correct option :** (c)

**Explanation :** Anti-venom against snake poison contains antibodies. Snake antivenom is a biological product that typically consists of venom neutralising antibodies derived from a host animal, such as a horse or sheep. It acts to neutralise the poisonous venom of the cobra. It is given to stop snake venom from binding to tissues and causing serious problems related to blood, tissue, or nervous system. Side effects from antivenom can include rash, itching, wheezing, rapid heart rate, fever, and body aches.

**Q. 6. Which of the following is not a lymphoid tissue?**

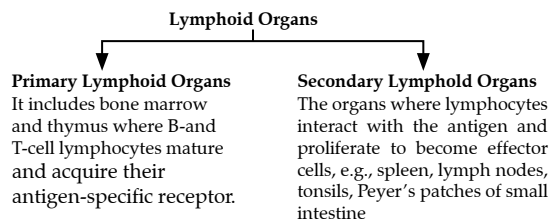
- (a) Spleen (b) Tonsils  
(c) Appendix (d) Thymus

[NCERT Exemp. Q. 19, Page 54]

**Ans. Correct option : (c)**

**Explanation :** Appendix is a vestigial organ (useless), not a lymphoid organ. It is muscular structure attached to the large intestine in the human body. It is an evolutionary remnant of a cecum that was once large and had vital digestive functions, which do not work the same way anymore.

Lymphoid organs are those organs where origin and/or maturation and proliferation of lymphocytes occur. Lymphoid organs are of two types : primary and secondary.



**Q. 7. Which of the following glands is large sized at birth but reduces in size with ageing?**

- (a) Pineal (b) Pituitary  
(c) Thymus (d) Thyroid

[NCERT Exemp. Q. 20, Page 54]

**Ans. Correct option : (c)**

**Explanation :** Thymus is a lymphoid gland, located near the heart and beneath the breastbone. It is quite large at the time of birth but after puberty the size of the thymus declines as the lymphoid tissue disappears and fat and fibrous tissue appears. It plays an important role in immunity. It helps in training and development of T-lymphocytes or T cells, an extremely important type of white blood cell. T cells defend the body from potentially deadly pathogens such as bacteria, viruses, and fungi.

While pineal gland (located at brain), pituitary gland (in brain), and thyroid (located in front of neck) remains constant in size since birth.

## Very Short Answer Type Questions

(2 marks each)

**Q. 1. Where are B-cells and T-cells formed? How do they differ from each other?**

[NCERT Exemp. Q. 3, Page 55]

**Ans. (i)** Both type of lymphocytes (B and T cells) and other cells of the immune system are produced in the bone marrow. [1]

**(ii)** B and T-cells are different from each other in the following aspects.

S. No	B-cells	T-cells
(i)	Made in the bone marrow.	Formed in the thymus.
(ii)	It plays an important role in humoral response.	It plays an important role in cell mediated response.
(iii)	They produce antibody against antigen.	They directly attack the antigen or attach B-cells to produce antibody.
(iv)	They do not respond to organ transplantation.	They respond to organ transplantation.

[1 = ¼ for each point]

**Q. 2. What would happen to immune system, if thymus gland is removed from the body of a person?**

[NCERT Exemp. Q. 5, Page 55]

**Ans. (i)** Thymus gland is a lymphoid organ which plays an important role in immunity. It secretes thymosin hormone which stimulates development of disease-fighting T-cells. [1]

**(ii)** If thymus gland is removed from the body of a person, his immune system will become weak. As a result, the person's body becomes prone to infectious diseases. [1]

**Q. 3. Many microbial pathogens enter the gut of humans along with food. What are the preventive barriers to protect the body from such pathogens? What type of immunity do you observe in this case?** [NCERT Exemp. Q. 6, Page 55]

**Ans. (i)** The preventive barriers to protect the body from microbial pathogens which enter the gut of humans along with food are as follows :

- (a) Mucus : The mucus coating of the epithelium lining of the gut helps in trapping microbes entering the body.  
(b) Lysozyme : It is present in the saliva, tears, etc. It destroys gram-positive bacterial cell walls causing cell lysis.

- (c) Hydrochloric acid present in gastric juice prevent microbial growth. [1½]
- (ii) The type of immunity in the above case is innate or inborn immunity. This immunity is present from birth and are non – specific (acts on many organism). [½]

**Q. 4. Why is mother’s milk considered the most appropriate food for a new born infant?**

[NCERT Exemp. Q. 7, Page 55]

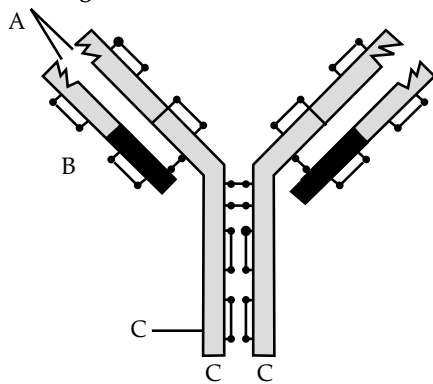
**Ans.** Mother’s milk is considered the most appropriate food for a new born infant, because colostrum, the yellowish fluid present in milk, contains several antibodies (especially IgA) which are absolutely essential for developing resistance for the new-born babies. [1]

**Q. 5. What are interferons? How do interferons check infection of new cells?**

[NCERT Exemp. Q. 8, Page 55]

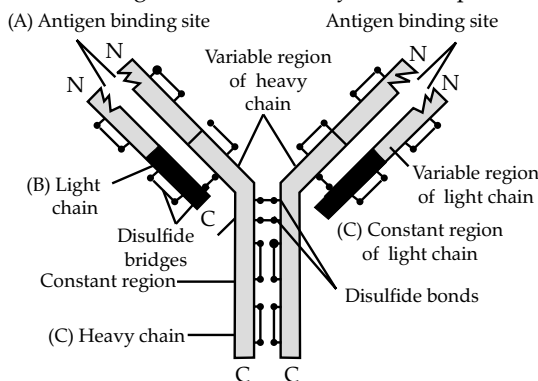
- Ans. (i)** Interferons are antiviral proteins. They are produced by the virus - infected cells and tumour cells. [1]
- (ii)** Interferons constitute a specialised defence system that works against viral infections. They enhance the action of phagocytes and natural killer cells and protect the non- infected cells from further viral infection. [1]

**Q. 6. In the figure, structure of an antibody molecule is shown. Name the parts A, B and C. Show A, B and C in the diagram.**



[NCERT Exemp. Q. 9, Page 56]

**Ans.** Labelled structure marked as A, B, and C in the structure of antibody molecule are antigen binding site, light chain and heavy chain, respectively.



Structure of an Antibody Molecule

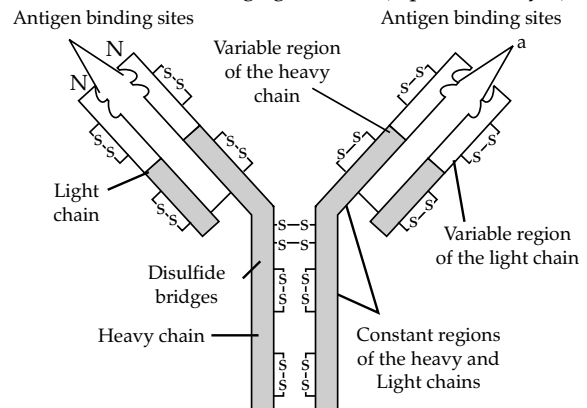
[2]

**Q. 7. Lymph nodes are secondary lymphoid organs. Explain the role of lymph nodes in our immune response.** [NCERT Exemp. Q. 13, Page 56]

- Ans. (i)** Lymphoid organs (part of lymphatic system) are of two types - primary and secondary lymphoid organ. [¼]
- (ii)** Primary lymphoid organs (e.g. bone marrow and thymus) acts as sites for the transformation of immature lymphocytes into antigen sensitive lymphocytes. [¼]
- (iii)** Secondary lymphoid organs [e.g. lymph nodes, tonsils, spleen, Peyer’s patches and mucosa associated lymphoid tissue (MALT)] acts as sites for the interaction with the antigen, proliferation of lymphocytes, transform into effector cells. [½]
- (iv)** Lymph nodes are small bean-shaped structures that filter substances that travel through the lymphatic fluid and help the body to fight against infection and disease. They trap the microorganisms or other antigens that enter the lymph and tissue fluid. Antigens trapped in the lymph nodes activate the lymphocytes and produce an immune response. They are found in the neck, axilla (underarm), chest, abdomen, and groin. [1]

**Q. 8. Why is an antibody molecule represented as H<sub>2</sub>L<sub>2</sub>?** [NCERT Exemp. Q. 14, Page 56]

- Ans. (i)** An antibody molecule (also known as immunoglobulin) is a type of Y-shaped tetrapeptide protein molecule. It is produced by B-lymphocytes in response to pathogens. [½]
- (ii)** It is represented as H<sub>2</sub>L<sub>2</sub> because it is formed of two identical small heavy chain (represented by H) and two identical long light chains (represented by L). [1]



[½]

**Q. 9. What does the term ‘memory’ of the immune system mean?** [NCERT Exemp. Q. 15, Page 56]

- Ans. (i)** When the body encounters a pathogen for the first time, it mounts an immune response by generating antibodies. This response is of low intensity. Subsequent encounter with the same pathogen elicits a highly intensified secondary response. This is ascribed to the fact that our body appears to have memory of the first encounter. [1]
- (ii)** This type of secondary immune response is elicited by memory T-cells, B-cell which keep ready to mount a rapid and vigorous attack as soon as the same pathogen infects the body again. [1]

## Short Answer Type Questions

(3 marks each)

**Q. 1. Differentiate between active immunity and passive immunity. [NCERT Exemp. Q. 1, Page 57]**

**Ans.** Difference between active immunity and passive immunity.

S. No.	Active immunity	Passive immunity
(i)	It is developed due to contact with pathogen or its antigen.	It is developed when ready-made antibodies are injected into the body.
(ii)	It has no side effects.	It may cause a reaction.
(iii)	It is slow but long lasting.	It is fast but lasts only for few days.
(iv)	It takes time to develop its response.	It is used when the immune response has to be faster.
(v)	Immunologic memory is present.	Immunologic memory is not present.
(vi)	Example - vaccination for polio, etc.	Example - administration of tetanus antitoxins, etc.

[3 = ½ marks for each points]

**Q. 2. What is the basic principle of vaccination? How do vaccines prevent microbial infections? Name the organism from which hepatitis B Vaccine is produced. [NCERT Exemp. Q. 18, Page 59]**

**Ans. (i)** The principle of vaccination is based on the property of 'memory' of immune system. In vaccination, a preparation of antigenic proteins or inactivated/live but weakened pathogens is introduced into the body. During vaccination a vaccine is injected or given orally. The host produces antibodies for a particular pathogen. Upon further exposure the pathogen is inactivated by the antibodies and disease state prevented. [1]

**(ii)** The antigens generate primary immune response by producing antibodies along with memory B-cells and T-cells. When the vaccinated person is attacked by the same pathogens, the existing memory B-cells and T-cells recognise the antigen and overwhelm the invaders with massive production of lymphocytes and antibodies and thereby prevent the microbial infection. [1]

**(iii)** Hepatitis-B vaccine is produced from yeast. [1]

**Q. 3. In the metropolitan cities of India, many children are suffering from allergy/asthma. What are**

**the main causes of this problem? Give some symptoms of allergic reactions.**

[NCERT Exemp. Q. 17, Page 59]

**Ans. (i)** In metropolitan cities life style is responsible in lowering of immunity and sensitivity to allergens. [1]

**(ii)** More polluted environment like dust in surroundings increases the chances of allergy in children. [1]

**(iii)** Some symptoms of allergic reactions are sneezing, watery eyes, running nose and difficulty in breathing. [1]

**Q. 4. A person shows strong unusual hypersensitive reactions when exposed to certain substances present in the air. Identify the condition. Name the cells responsible for such reactions. What precaution should be taken to avoid such reactions. [NCERT Exemp. Q. 20, Page 59]**

**Ans. (i)** If a person is hypersensitive to certain substance present in the air, he may be allergic to it. [1]

**(ii)** Mast cells are responsible for this condition. It releases certain chemicals (e.g., histamine and serotonin) in response to this substance, that result in allergic reaction. [1]

**(iii)** To avoid such reactions following precautions must be taken :

**(a)** The use of drugs like antihistamine, adrenaline, and steroids quickly reduce the symptoms of allergy.

**(b)** Avoid contact with substances to which a person is hypersensitive. [1]

**Q. 5. For an organ transplant, it is an advantage to have an identical twin. Why?**

[NCERT Exemp. Q. 21, Page 59]

**Ans. (i)** Organ transplantation is a process in which replacement of a diseased organ takes place with a healthy organ from a donor with a compatible tissue type. Organs such as a kidney may be donated by living donors or harvested from brain-dead organ donors. [1]

**(ii)** For an organ transplant, it is an advantage to have an identical twin because

**(a)** the organ will have same surface markers and therefore, the recipient's immune system will not identify it as foreign and will not react against it. [1]

**(b)** In case of different surface markers, the immune system starts a reaction, kills the foreign tissue or rejects it. [1]



## Long Answer Type Questions

(5 marks each)

**Q. 1. What are recombinant DNA vaccines? Give two examples of such vaccines. Discuss their advantages. [NCERT Exemp. Q. 8, Page 60]**

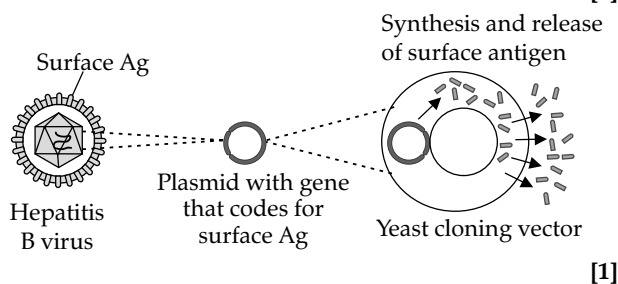
**Ans. (i) Recombinant DNA vaccines :**

**(a)** These vaccines are produced through recombinant DNA technology.

**(b)** They are made up of a small circular DNA (plasmid) that has very tiny piece of pathogen DNA

incorporated in it to produce one or two specific proteins of the pathogen.

- (c) This recombinant DNA is introduced into the bacteria or yeast cells, where it can use their machinery to produce polypeptides of pathogen.
- (d) These are used as vaccines to trigger a range of immune responses. [2]
- (ii) Examples :
- (a) Bird flu DNA vaccine. [1]
- (b) Hepatitis-B vaccine (produced from yeast) : It contains a protein (antigen) that stimulates the body to make protective antibodies against hepatitis-B infection and its complications such as permanent liver damage, which can lead to liver cancer and death. [1]



- (iii) Advantages of recombinant DNA vaccines :
- (a) These are advantageous over killed or attenuated vaccines since, they do not get virulent or mutated again as it is seen in case of attenuated vaccines. These are highly pure, specific, and elicits strong immune response. [1]

**Q. 2. What is Pulse Polio Programme of Government of India? What is OPV? Why is it that India is yet to eradicate Polio? [NCERT Exemp. Q. 7, Page 60]**

- Ans.** (i) Pulse Polio Programme of Government of India :
- (a) It is an immunisation campaign established by the Government of India in 1995-96 as a result of World Health Organization's (WHO) Global polio eradication initiatives.

- (b) This programme eradicates poliomyelitis (polio) and all children under 5 years are given doses of oral polio vaccine in December and January every year until polio is eradicated.

[1 = ½ marks for each point]

- (ii) Oral Polio Vaccine (OPV) :
- (a) OPV is a live-attenuated vaccine. It is produced by the passage of virus through non-human cells at a sub-physiological temperature, which produces spontaneous mutations in the viral genome.
- (b) There are different types of oral poliovirus vaccine, which may contain one, a combination of two, or all three different serotypes of attenuated vaccine.
- (c) It provides long lasting immunity than the Salk vaccine. One dose of OPV produces immunity to all three poliovirus serotypes in approximately 50% of recipients.
- (d) The oral polio vaccine was developed by Albert Sabin and came into commercial use in 1961.

[2 = ½ marks for each point]

- (iii) India is yet to eradicate polio because in spite of many initiatives taken by government, few cases have been reported as given below :
- (a) The last reported cases of polio in India was in West Bengal and Gujarat on 13 January 2011.
- (b) Earlier this year, the World Health Organization (WHO) had removed India from the list of polio-endemic countries. If no fresh case is reported the country will be declared polio free.
- (c) A nine-month old boy from Navi Mumbai has been found positive for Vaccine-Derived Polio-Virus (VDPV) type 2 in July 30, 2013. He was on ventilator at BJ Wadia Hospital in Parel. This is the fourth such case recorded in the country that year.
- (d) In India the main obstacle in the eradication of polio had been the refusal of polio vaccine by certain communities on account of illiteracy and misinformation. [2 = ½ marks for each point]



## TOPIC-3 AIDS and Cancer

### Quick Review

- ❖ AIDS was **first recognised in Hatai (USA)** in 1981 among a group of young homosexuals who were addicts of heroin and other narcotics.
- ❖ Human immunodeficiency virus (HIV), **first reported in green monkey**, was isolated by **Montagnier et al (1983)** in France and later by **Gallo et al** in USA (1984).

#### TIPS...

- Study the terms like HIV window period, Opportunistic infections, metastasis, carcinogen, oncogenes etc.
- Study carefully the stages of AIDS, their treatment by using ELISA.
- Give more emphasis on the causes and detection of cancer.

- ❖ HIV destroys T-helper cell (a type of white blood cells) and makes copies of itself inside these cells. T-helper cells is called as CD<sub>4</sub> cells.
- ❖ Healthy adults generally have a CD<sub>4</sub> count of 500 to 1,500 per cubic millimetre. A person with HIV whose CD<sub>4</sub> count falls below 200 per cubic millimetre will be diagnosed with AIDS.
- ❖ **Viral load test** measures the amount of virus (HIV) in the blood which will help in determining the probable progression of the disease.
- ❖ Four types of gene responsible for the cell division process are :
  - **Oncogenes** : It transforms the cell into cancerous form.
  - **Tumour suppressor genes** : It instruct the cells when not to divide.
  - **Suicide genes** : It control apoptosis and tell the cell to kill itself if something goes wrong.
  - **DNA-repair genes** : It instruct a cell to repair damaged DNA.
- ❖ **Apoptosis** is a process of programmed cell death in which a series of molecular steps in a cell lead to its death. It plays an important role in developing and maintaining the health of the body by eliminating old cells, unnecessary cells, and unhealthy cells.
- ❖ **Taxol** is anticancer drug obtained from *Taxus baccata*.
- ❖ **Paps test** is used to detect the **cancer of cervix** and **barium test** is performed for **alimentary canal**.

**TRICKS...**

- ✎ Make concept map on AIDS and Cancer
- ✎ Make difference table on Benign and Malignant tumour, normal and cancerous cell.



## Multiple Choice Questions

(1 mark each)

Q. 1. AIDS is caused by HIV. Among the following, which one is not a mode of transmission of HIV?

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

[NCERT Exemp. Q. 12, Page 53]

Ans. Correct option : (c)

*Explanation* : AIDS, caused by HIV, is a sexually transmitted disease. It cannot be transmitted by shaking hands with the AID infected person.

Transmission of HIV-infection generally occurs by the following :

- (i) Sexual contact with infected person.
- (ii) Transfusion of contaminated blood and blood products.
- (iii) Sharing infected needles as in case of intravenous drug abusers.
- (iv) Infected mother to her child through placenta.

Q. 2. The genes causing cancer are

- (a) structural genes.                      (b) expressor genes.
- (c) oncogenes.                              (d) regulatory genes.

[NCERT Exemp. Q. 8, Page 52]

Ans. Correct option : (c)

*Explanation* : Oncogene is a genetic material which have the capability to induce cancer. Normal cells have genes called cellular oncogenes or proto-oncogenes. These genes are present in inactivated state, but under certain conditions these get

mutated and transformed into cancer causing oncogenes.

Structural gene, expressor gene and regulatory genes are responsible for regulation of gene expression (operon model).

Q. 3. In malignant tumours, the cells proliferate, grow rapidly and move to other parts of the body to form new tumours. This stage of disease is called

- (a) metagenesis.                              (b) metastasis.
- (c) teratogenesis.                            (d) mitosis.

[NCERT Exemp. Q. 9, Page 52]

Ans. Correct option : (b)

*Explanation* : Metastasis may be defined as the development of secondary malignant growths at a distance from a primary site of cancer. Cancer is defined as an uncontrolled division or proliferation of cells without any differentiation. Repeated division of cells form a large mass of tissue called tumours which are of two types, that is, benign (non-cancerous) and malignant (cancerous). Hence, the invasion of cancerous cells from one part to the other parts of body is called metastasis.

Metagenesis is the alteration of generation. Tetragenesis is a prenatal toxicity characterised by structural, functional defects in the developing embryo or foetus. Mitosis is a type of cell division that results in two daughter cells.



## Very Short Answer Type Questions

(1 or 2 marks each)

Q. 1. The immune system of a person is suppressed. In the ELISA test, he was found positive to a pathogen.

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

[NCERT Exemp. Q. 2, Page 55]

- Ans. (a) The patient is suffering from AIDS. [½]  
 (b) The causative organisms of AIDS are human immunodeficiency Virus (HIV). It is a retro virus containing RNA as genetic material. [½]

(c) Macrophages and helper T lymphocyte cells of the human body are affected by the pathogen. [1]

Q. 2. If a patient is advised Anti-Retroviral Therapy, which infection is he suffering from? Name the causative organism.

[NCERT Exemp. Q. 16, Page 56]

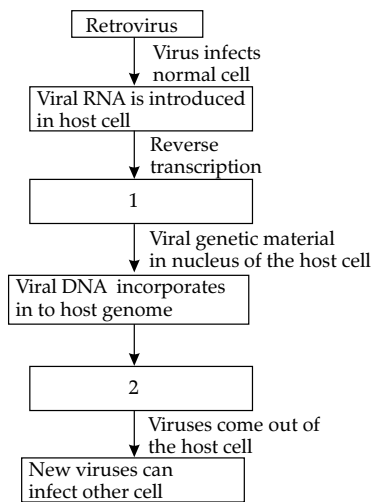
- Ans. (i) If a patient is advised Anti-Retroviral Therapy, then the patient is suffering from AIDS. [½]  
 (ii) The causative agent is Human Immunodeficiency Virus (HIV), a member of 'retrovirus group'. [½]



## Short Answer Type Questions

(3 marks each)

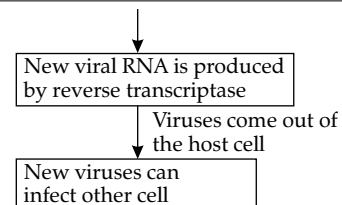
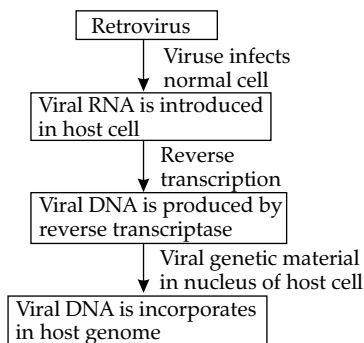
Q. 1. In the given flow diagram, the replication of retrovirus in a host is shown. Observe and answer the following questions.



- Fill in (1) and (2)
- Why is the virus called retrovirus?
- Can the infected cell survive while viruses are being replicated and released.

[NCERT Exemp. Q. 6, Page 57]

- Ans. (a) 1. Viral DNA is produced by reverse transcriptase.  
 2. New viral RNA is produced by reverse transcriptase.



- (b) The virus is called retrovirus because it does not follow the central dogma of biology (DNA → RNA → Proteins). Its genetic material is RNA that is transcribed to DNA using enzyme reverse transcriptase. [1]

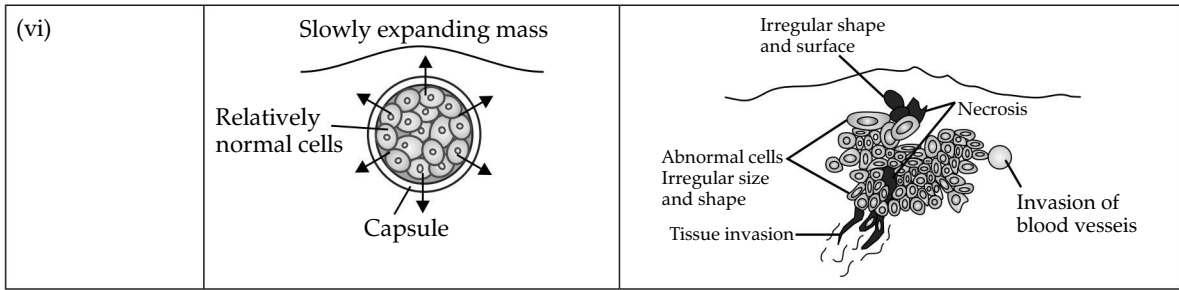
(c) Yes, the infected cell can survive, while viruses are being replicated and released. [1]

Q. 2. Differentiate between benign tumour and malignant tumour.

[NCERT Exemp. Q. 2, Page 57]

Ans. Difference between benign tumour and malignant tumour.

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



(3 = 1/2 marks for each points)

**Q. 3. Give the full form of CT and MRI. How are they different from each other? Where are they used?**

[NCERT Exemp. Q. 10, Page 58]

**Ans. (i)** Full form of CT and MRI are Computed Tomography and Magnetic Resonance Imaging, respectively. [1]

**(ii)** CT uses X-rays to generate 3-D images of internal organs whereas MRI uses strong magnetic fields and non-ionising radiations to detect pathological and physiological changes in the living tissue accurately. [1]

**(iii)** Both CT and MRI are used in cancer detection. [1]

**Q. 4. What is cancer? How is a cancer cell different from the normal cell? How do normal cells attain cancerous nature?**

[NCERT Exemp. Q. 19, Page 59]

**Ans. (i)** Cancer may be defined as an abnormal and uncontrolled division of cells. Genes called cellular oncogenes (c-onc) or proto-oncogenes present in normal cells when activated under certain conditions lead to oncogenic transformation of the normal cells leading to cancer. [1]

**(ii)** A cancer cell is different from the normal cell in following ways :

S. No.	Normal cell	Cancerous cell
(a)	Normal cells show the property of contact inhibition. Therefore, when these cells come into contact with other cells, they stop dividing.	Cancerous cells lack the property of contact inhibition. Therefore, they continue to divide, thereby forming a mass of cells or tumour.
(b)	They undergo differentiation after attaining a specific growth.	They do not undergo differentiation.
(c)	These cells remain confined at a particular location.	These cells do not remain confined at a particular location. They move into neighbouring tissues and affects its function.
(d)	Life spans is indefinite.	Life span is definite.

[1]

**(iii)** In our body, the growth and differentiation of cells is highly controlled and regulated. The normal cells show a property called contact inhibition. The surrounding cells inhibit uncontrolled growth and division of cells. When the normal cells lose this property, it become cancerous cells giving rise to masses of cells called tumours. Transformation of normal cells into cancerous cells is induced by some physical, chemical, and biological agents (carcinogens). [1]



## Long Answer Type Question

(5 marks)

**Q. 1. What are the methods of cancer detection? Describe the common approaches for treatment of cancer.** [NCERT Exemp. Q. 5, Page 60]

**Ans. (i)** Cancer is a disease in which abnormal cells divide without control and can attack nearby tissues. These cells can also spread to other parts of the body through the blood and lymph systems. Therefore, early detection of cancer, is essential as it allows the disease to be treated successfully in many cases. [1]

**(ii)** The methods of cancer detection and diagnosis are as follows.

- (a) Biopsy and histopathological studies of the tissue/ blood/bone marrow.
- (b) Tests for increased cell counts (in the case of leukaemia blood cancer).
- (c) Techniques like radiography (use of X-rays), CT (computed tomography), and MRI (Magnetic Resonance Imaging) are used to detect cancers of the internal organs.
- (d) Detection of cancer specific antigens.

- (e) Molecular biology techniques to detect genes in individuals with inherited susceptibility to certain cancers. [2½ = ½ marks for each method]
- (iii) The common approaches for treatment of cancer are as follows :
- (a) Surgery : It is a procedure in which a surgeon removes tumour from the body.
- (b) Radiation therapy : It uses high doses of radiation to kill cancer cells and shrink tumours.
- (c) Immunotherapy : It helps your immune system to fight cancer by using interferon to boost cancer cell killing.
- (d) Hormone therapy : It slows or stops the growth of breast and prostate cancers that uses hormones to grow.
- (e) Stem Cell Transplant : It is a procedure that restore blood-forming stem cells in cancer patients who have had theirs destroyed by very high doses of chemotherapy or radiation therapy.
- (f) Targeted therapy : It targets the changes in cancer cells that help them grow, divide, and spread. [1½ = ¼ for each treatment]



## TOPIC-4

### Drug and Alcohol Abuse

#### Quick Review

- ❖ Psychoactive or psychotropic drugs are mood altering drugs which change your mental and emotional state.
- ❖ Popular nicknames for cocaine are blow, coke, crack, rock, snow.
- ❖ Amphetamines and cocaine are strong stimulants.
- ❖ LSD (lysergic acid diethylamide) is one of the dangerous hallucinogens. It is derived from Ergot fungus (*Claviceps purpurea*).
- ❖ Belladonna is a narcotic, diuretic and antispasmodic. Leaves contain atropine which is used to dilate the pupil.
- ❖ Tobacco contains carbon monoxide, polycyclic aromatic hydrocarbons and tars.
- ❖ Pharmacology is the science dealing with drugs, their sources, appearances, chemistry, action and uses.



#### Multiple Choice Questions

(1 mark each)

Q. 1. 'Smack' is a drug obtained from the

- (a) latex of *Papaver somniferum*.  
 (b) leaves of *Cannabis sativa*.  
 (c) flowers of *Datura*.  
 (d) fruits of *Erythroxyl coca*.

[NCERT Exemp. Q. 13, Page 53]

Ans. Correct option : (a)

**Explanation :** Heroin, commonly called smack, is chemically diacetyl morphine. It is a white, odourless, bitter, crystalline compound which is obtained by acetylation of morphine, extracted from the latex of poppy plant (*Papaver somniferum*). Leaves of *Cannabis sativa* (commonly called bhang) produces cannabinoids. *Datura* flower produces tropane alkaloids (mainly scopolamines, hyoscyamine and atropine). Atropine reduce salivation and bronchial secretions before surgery.

It is also used to dilate the pupil before eye exams and to relieve pain which is caused by swelling and inflammation in the eye. Cocaine is extracted from the dried leaves and young twigs of *Erythroxyl coca*.

Q. 2. Tobacco consumption is known to stimulate secretion of adrenaline and nor-adrenaline. The component causing this could be

- (a) nicotine. (b) tannic acid.  
 (c) curamin. (d) catechin.

[NCERT Exemp. Q. 17, Page 54]

Ans. Correct option : (a)

**Explanation :** Nicotine is highly addictive and harmful for human health. *Nicotiana tabacum*, the type of nicotine is found in tobacco plants. Nicotine present in tobacco stimulates adrenal gland to release adrenaline and noradrenaline hormone which in turn increases the blood pressure and heart rate.



## Very Short Answer Type Questions

(2 marks)

**Q. 1.** If a regular dose of drug or alcohol is not provided to an addicted person, he shows some withdrawal symptoms. List any four such withdrawal symptoms. [NCERT Exemp. Q. 10, Page 56]

- Ans.** (i) The withdrawal symptoms are the unfriendly physical and mental effects that result when someone stop taking a regular dose of drug or alcohol. [1]  
 (ii) The list of such withdrawal symptoms are as follows :  
 (a) Anxiety (b) Shakiness  
 (c) Nausea (d) Sweating.

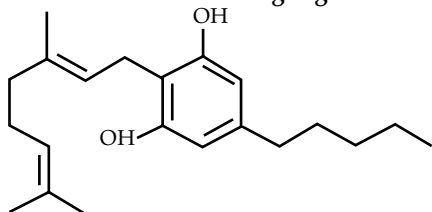
[1 = ¼ marks for each symptom]



## Short Answer Type Questions

(3 marks each)

**Q. 1.** The outline structure of a drug is given below.



- (a) Which group of drugs does this represent?  
 (b) What are the modes of consumption of these drugs?  
 (c) Name the organ of the body which is affected by consumption of these drugs.

[NCERT Exemp. Q. 9, Page 58]

**Ans.** (a) 1. The given outline structure represents the group of drugs called cannabinoids. These groups of active compounds are found in marijuana. Marijuana refers to the dried leaves, flowers, stems, and seeds from the *Cannabis sativa* or *Cannabis indica* plant. [1]

(b) 1. The most well-known among these compounds is the delta-9-tetrahydrocannabinol ( $\Delta^9$ -THC), which is the main psychoactive ingredient in cannabis. [1]

2. Mode of consumption of cannabinoids are nasal inhalation or oral intake. [1]

(c) Organs affected by consumption of these drugs are heart and cardiovascular system. [1]

**Q. 2.** Many secondary metabolites of plants have medicinal properties. It is their misuse that creates problems. Justify the statement with an example.

[NCERT Exemp. Q. 11, Page 58]

**Ans.** (i) Many secondary metabolites of plants have medicinal properties. For examples, drugs like morphine, lysergic acid diethylamides (LSD), terpenoids opioids etc. are normally used as medicines to help patients coping with mental illnesses like depression and insomnia. [1]

(ii) Morphine is a very effective sedative and painkiller and is very useful in patients who have undergone surgery. [1]

(iii) Misuse of plant metabolites in more frequency as compared to prescribed for medicinal purposes can harm one's physical, physiological or functional

behaviour creating problem for the society and slowly moves towards the death. [1]

**Q. 3.** From which plant cannabinoids are obtained? Name any two cannabinoids. Which part of the body is affected by consuming these substances?

[NCERT Exemp. Q. 16, Page 59]

**Ans.** (i) Cannabinoids are group of chemicals which are obtained from the inflorescence of the plant *Cannabis sativa*. [1]

(ii) Examples of cannabinoids are : marijuana, hashish, charas, ganja. [1]

(iii) These chemicals interact with cannabinoid receptors of the body, mainly present in the brain and suppresses the release of neurotransmitter. Cardiovascular system of the body is also affected adversely by consuming these substances. [1]

**Q. 4.** Why cannabinoids are banned in sports and games? [NCERT Exemp. Q. 12, Page 59]

**Ans.** (i) Cannabinoids, produced by the plant *Cannabis Sativa*, are banned in sports, because athletes misuse these drugs for the following reasons :

(a) It enhances their performance by improving muscle relaxation, reducing anxiety, and extinct fear memories (e.g., negative experiences). [1]

(b) It improves sleep time and recovery, which may favour performance when an athlete is facing multiple competitions in a short period of time. [1]

(ii) But drugs obtained from cannabinoids have a serious negative effect on their general health and in long term can hamper the normal functioning of organ system. It causes tachycardia, decrease vital capacity of lungs, impair perceptions and delay responses. [1]

**Q. 5.** Do you consider passive smoking is more dangerous than active smoking? Why?

[NCERT Exemp. Q. 3, Page 57]

**Ans.** (i) Yes, passive smoking can be equally or you can say more dangerous than active smoking because it exposes the persons to the same harmful effect of smoke. [1]

- (ii) Passive or second-hand smoking means being in the same area where someone is smoking and getting exposed to smoke in the surrounding air. [½]
- (iii) Second-hand smoke is a mixture of side stream and mainstream smoke. The smoke which comes from the burning end of a cigarette is termed as side stream smoke and the smoke that is exhaled by the smoker is mainstream smoke. [½]
- (iv) Second hand smoke affects an adult's heart and blood vessels directly. Once inhaled, the smoke can trigger release of mucus in the bronchioles that blocks the air ways. This induces coughing. But prolonged exposures can lead to variety of disorders such as lung cancer, cardiac ailments and chronic respiratory illnesses like bronchial asthma, chronic bronchitis, allergies, chronic obstructive pulmonary disease. [1]

**Q. 6. What is secondary metabolism?**

[NCERT Exemp. Q. 13, Page 59]

- Ans.** (i) Secondary metabolism consists of metabolic pathways and products of metabolism that are not essential for the general functioning of the organisms but have more specialised functions. [1]
- (ii) In case of plant, metabolites help in the growth and development of plants. It also facilitates the primary metabolism. High concentration of secondary metabolites results in production of more resistant plant. [2]

**Q. 7. Drugs and alcohol give short-term 'high' and long-term 'damages', Discuss.**

[NCERT Exemp. Q. 14, Page 59]

- Ans.** (i) There are many reasons like, curiosity, need for adventure and excitement and experimentation, etc. which motivate youngsters towards drug and alcohol use. The first use of drugs or alcohol may be out of

curiosity or experimentation, but later the youngsters start using these to escape facing problems. Continuous usage of drug and alcohol may cause short - term and long-term damages (given below).

- (ii) Short-term effects of drugs/alcohols
    - (a) A relaxing effect and reduced tension.
    - (b) Lowered inhibitions and poor concentration.
    - (c) Slow reflexes and slow reaction time.
    - (d) Reduced coordination and slower brain activity.
    - (e) Sensations and perceptions that are less clear.
  - (iii) Long-term effects of drugs/alcohols
    - (a) Disrupts normal brain development.
    - (b) Liver damage and liver cirrhosis.
    - (c) Brain cells die, decreasing brain mass.
    - (d) Stomach and intestinal ulcers and destroyed organs.
    - (e) Blood pressure increases, causing heart disease, heart attack, or stroke.
    - (f) Male sperm production decreases.
    - (g) Anaemia due to lower levels of iron and vitamin B.
    - (h) Foetal alcohol syndrome in unborn children.
- (i) Death. [3]

**Q. 8. What are lifestyle diseases? How are they caused? Name any two such diseases.**

[NCERT Exemp. Q. 22, Page 59]

- Ans.** (i) Life style diseases includes those diseases which are associated with the way a person or group of people lives. [1]
- (ii) Life style disease are caused by specific food habits, work-related posture or exposure to harmful radiations or substances, lack of physical exercise, mental stress, etc. [1]
- (iii) Examples of lifestyle diseases are - cancer, alcoholism, heart disease, etc. [1]



## Long Answer Type Questions

(5 marks each)

**Q. 1. Drugs like LSD, barbiturates, amphetamines, etc., are used as medicines to help patients with mental illness. However, excessive doses and abusive usage are harmful. Enumerate the major adverse effects of such drugs in humans.**

[NCERT Exemp. Q. 6, Page 60]

- Ans.** (i) Drugs are classified according to their common effects and actions on the mind and body. These drugs are :
- (a) Depressants : They slow normal brain function and are used to treat anxiety and sleep disorders. Examples include : alcohol, Valium, Xanax, Librium, and barbiturates. [½]
  - (b) Hallucinogens : These drugs cause altered perception and feeling. They have powerful mind-altering effects and can change how the brain perceives time, everyday reality, and the surrounding environment.

Examples are LSD, PCP, MDMA (Ecstasy), marijuana, mescaline, and psilocybin. [½]

- (c) Opiates : They are powerful painkillers. They produce a quick, intense feeling of pleasure followed by a sense of well-being and calm. Examples of opiates are heroin, morphine, codeine, and OxyContin. [½]
  - (d) Stimulants : These drugs elevate mood, increase feelings of well-being, and increase energy and alertness. Repeated use of stimulants can result in paranoia and hostility. Examples include : cocaine, methamphetamine, amphetamine, MDMA (Ecstasy), nicotine, and caffeine. [½]
- (ii) When the above-mentioned drugs used in excessive amount they will cause harmful effects on the body. Harmful effects of these drugs like LSD, barbiturates are given below :
- (a) They will face problems in social adjustment. [¼]

- (b) Reckless behaviour, vandalism and violence. [¼]
- (c) Withdrawal symptoms can be severe and life threatening. [½]
- (d) Anxiety, shakiness, nausea and sweating, loss of mind control. [½]
- (e) Withdrawal, isolation, depression, fatigue, aggressive behaviour. [½]
- (f) Lack of interest in personal hygiene, fluctuations in weight and appetite. [½]
- (g) Excessive doses of drugs may lead to coma and death may occur due to respiratory failure, heart failure or cerebral haemorrhage. [½]

**Q. 2. Why do some adolescents start taking drugs? How can this be avoided?**

[NCERT Exemp. Q. 3, Page 59]

**Ans. (i)** Adolescent experiment with drugs or continue taking them due to the following reasons :

- (a) They have peer group pressure.
- (b) For adventure and excitement.
- (c) Unstable or unsupportive family structures.
- (d) Desire to do more physical and mental work.
- (e) To satisfy their curiosity. Their curiosity motivates him/her to do experiment with drugs.
- (f) To forget or overcome their frustration and depression, due to failure in examinations or in other activities.
- (g) Due to lack of confidence, they'll do things under the influence of alcohol or drugs that they might not otherwise. [2½]

**(ii)** The following measures can be taken to avoid drug abuses :

- (a) Avoid undue pressure on child to perform beyond his/her capability in studies, sports or any other activities.
- (b) Education and counselling are very important to face problem of stress and failure in life.
- (c) Seeking help from parents, elders and peers would help the young one to open and share their feelings and concern.
- (d) Looking for danger signs and taking appropriate measures to treat them.
- (e) Seeking professional and medical help for de-addiction and rehabilitation. [2½]

**Q. 3. In your locality, if a person is addicted to alcohol, what kind of behavioural changes do you observe in that person? Suggest measures to overcome the problem.** [NCERT Exemp. Q. 4, Page 59]

**Ans. (i)** Alcoholism is the most severe form of alcohol abuse which involves the inability to manage drinking habits. Individuals struggling with alcoholism often feel as though they cannot function normally without alcohol. [1]

**(ii)** If a person is addicted to alcohol, it will give rise to some behavioural changes in that person, like,

**(a)** They are associated with social crimes and dissolution of moral and cultural inhibitions.

**(b)** Violence and other corrupt practices in the community are often directly or indirectly due to the consumption of alcohol.

**(c)** They spend a substantial amount of money on alcohol and deprive their children and other members of the family for their basic needs.

[1½ = ½ marks for each point]

**(iii)** Measures that should be taken to overcome the above-mentioned problem are as follows :

**(a)** Avoid undue peer pressure : Every person has his/her own choice and personality, which should be kept in mind. So, he/she should not be pressurised unduly to do beyond his/her capacities, in work condition and other in social get together or activities.

**(b)** Education and counselling : It helps to overcome the problems, like stresses, disappointments and failure in life. One should utilise himself/herself energy in some beneficial activities like sports, music, reading, yoga, and other extracurricular activities.

**(c)** Seeking help from parents and peers : In case of minors, whenever, there is any problem, one should seek help and a guidance from parents and peers. This would help young to share their feelings of anxiety and wrong doings.

**(d)** Looking for danger signs : If friends find someone using drugs or alcohol, they should bring this to the notice of parents or teacher so that appropriate measures can be taken to diagnose the illness and the causes, this would help in taking proper remedial steps or treatment.

**(e)** Seeking professional and medical helps : Highly qualified psychologists, psychiatrists and de-addiction and rehabilitation programmes can help individuals who are suffering from drug/alcohol abuse. If such help is provided to the affected persons, with sufficient efforts and will power, the patient could be completely cured and lead normal and healthy life. [2½ = ½ marks for each point]