UNIT-VIII CHAPTER **Biology** and HUMAN HEALTH AND DISEASES Human Welfare

Syllabus

Health and Disease : Pathogens; parasites causing human diseases (malaria, dengue, chikungunya, filariasis, \geq ascariasis, typhoid, pneumonia, common cold, amoebiasis, ring worm) and their control; Basic concepts of immunology - vaccines; cancer, HIV and AIDS; Adolescence, drug and alcohol abuse.

Chapter Analysis

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List of Topics		2016 2017			2018	
		D	OD	D	OD	D/OD
Diseases in Humans	 Diseases spread by Aedes mosquito Causative agent of Amoebiasis and its symptoms 	1 Q (2 M)				1 Q (1 M)
Immunity	 Immunity Secondary immune response Barriers of innate immunity Passive immunity (Importance of breast feeding) Interferons 	1 Q (3 M)	1 Q (3 M)	1 Q (1 M)	1 Q (2 M)	1 Q (1 M) 1 Q (3 M)
AIDS	• Life cycle of HIV		1 Q (2 M)	1 Q (3 M)		
Cancer	·N					
Drugs and Alcohol Abuse	 Source and effects of heroin drug on human body Drug abuse by adolescents 	1 Q (3 M)			1 Q (3 M)	1 Q (2 M)

• On the basis of above analysis, it can be concluded that topics like Diseases that spread by mosquitoes, Amoebiasis, concept of Immunity, interferon, Life cycle of HIV virus and concept of drug abuse by adolescents are important topics from exam point of view.

TOPIC-1 Health and Related Aspects, Common Human Diseases and Immunity

Revision Notes

- > Health is a state of complete physical, mental and social well-being.
- > Health is affected by genetic disorders, infections, sedentary life style (Junk food, lack of exercise, habits, etc).
- **Disease** : A disease can be defined as any condition that may lead to discomfort, distress, health problems or death of the affected person.

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- Congenital Diseases: These are diseases which are present since birth. For instance, hole in the heart of an infant. They are caused by some genetic abnormalities or metabolic disorder or malfunctioning of an organ.
- Acquired Diseases : These are diseases which may occur after birth during one's lifetime.
- Based on their ability or inability to spread from one individual to another, acquired diseases are of two types :
 - (a) Infectious or Communicable diseases : The diseases which can be transmitted from diseased person to healthy person by means of infectious agents are known as infectious or communicable diseases. For example, tuberculosis, measles, malaria, etc.
 - (b) Non-infectious or Non-communicable diseases : The diseases which cannot be transmitted from an affected individual to a healthy person are known as non-infectious or non-communicable diseases. For example, high blood pressure, Cancer, Allergy, Obesity, etc.
- > Among non-infectious diseases, cancer is the major cause of death.
- Pathogens are disease causing organisms.
- Parasites are pathogens as they harm the host by living in or on them.
- > Pathogens have to adapt to life within the environment of the host.
 - **Common Infectious Diseases in Man**
- 1. BACTERIAL DISEASES
 - (a) Typhoid
 - Pathogen : Salmonella typhi.
 - **Mode of transmission** : It enters the small intestine through food and water and migrates to other organs through blood.
 - **Symptoms** : Sustained high fever (39°- 40°C), weakness, stomach pain, constipation, headache and loss of appetite. Intestinal perforation and death may occur:
 - **Confirmation** : Widal test is used for confirmation of the disease.
 - (b) Pneumonia
 - Pathogen : Streptococcus or Diplococcus pneumoniae & Haemophilus influenzae.
 - Mode of transmission : Inhaling the droplets aerosols released by an infected person. Sharing glasses and utensils with an infected person.
 - **Symptoms** : Infects lung's alveoli, the alveoli get filled with fluid leading to respiratory problems. Fever, chills, cough, headache.
 - Severe cases : Lips and finger nails turn gray to bluish colour.
 - Dysentery, plague, diphtheria are some other bacterial diseases in humans.
- 2. VIRAL DISEASES
 - (a) Common cold
 - Pathogen : Rhino Viruses
 - Mode of transmission : Inhaling droplets resulting from cough or sneezes through contaminated objects.
 - **Symptoms** : Infects nose and respiratory passage. Nasal congestion and discharge, sore throat, hoarseness, cough, headache, tiredness, etc. Last for 3-7 days.
- 3. PROTOZOAN DISEASES
 - (a) Malaria
 - Pathogen : Plasmodium sp. (P. vivax, P. malariae, P. ovale. and P. falciparum).
 - Mode of transmission : Biting of *Anopheles* mosquito.
 - Symptoms : Haemozoin causes chill and high fever recurring every 3-4 days.

Life cycle of *Plasmodium* : Life cycle of *Plasmodium* has three phases - *Schizogony*, *gamogony* and *sporogony*. Female *Anopheles* mosquito is the primary host while man is the secondary host.

Life Cycle of Plasmodium in Man

- (a) The infective stage of *Plasmodium* is the sporozoite, which is injected in to the blood of the human by the female *Anopheles* mosquito.
- (b) From the human blood, sporozoites reach the liver cells where they multiply.
- (c) The liver cells rupture to liberate the parasites in to the blood where they attack the RBCs, multiply and cause their rupture.
- (d) The rupture is associated with the release of a toxin called haemozoin, which is responsible for the recurring chill and high fever within 3 4 days.

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(e) The development of gametocytes takes place in the RBCs, which are of two types : male gametocytes or microgametocytes, and female gametocytes or macrogametocytes.

Life cycle of Plasmodium in Female Anopheles Mosquito

- (a) When a female *Anopheles* mosquito sucks the blood of an infected human host, it receives the RBCs including gametocytes.
- (b) Further development occurs in the stomach wall of the mosquito, the gametes fuse to form a zygote.
- (c) The zygote undergoes further development to form sporozoites.
- (d) The sporozoites after liberation from the stomach wall move to different organs in the body cavity, but many of them penetrate the salivary glands.
- (e) The mosquito now becomes infective, when the female *Anopheles* mosquito bites a healthy person the sporozoites are injected in his / her blood along with saliva.

(b) Amoebiasis (Amoebic dysentery) or Enteritis.

- Pathogen : Entamoeba histolytica. Found in the large intestine of humans.
- Mode of transmission : Houseflies (mechanical carriers) transmit parasites from faeces of infected person to food and water and thereby contaminating it.
- Symptoms : Constipation, abdominal pain and cramps, stools with excess inucous and blood clots.

4. HELMINTH DISEASES

- (a) Ascariasis
 - **Pathogen** : *Ascaris* (Intestinal parasite).
 - Mode of transmission : Soil, water, vegetables, fruits etc. contaminated with faeces containing eggs of parasites.
 - Symptoms : Internal bleeding, muscular pain, fever, anaemia and blockage of intestinal passage.

(b) Filariasis (Elephantiasis)

- **Pathogen** : Filarial worms or *Wuchereria* (*W. bancrofti & W. malayi*).
- Mode of transmission : Bite of female Culex mosquito.
- **Symptoms** : Filarial worms live in lymphatic vessels (usually of lower limbs). It causes chronic inflammation of the organs in which they live for many years. Limbs and genital organs may be deformed.

5. FUNGAL DISEASES

- (a) Ring worms
 - Pathogens : Microsporum, Trichophyton & Epidermophyton. They are seen in groin between the toes.
 - Mode of transmission : From sol or by using towels, cloths, comb, etc. Heat and moisture help fungi to grow.
 - Symptoms : Appearance of dry, scaly lesions on various body parts such as skin, nails and scalp. Intense itching.

Other Infectious Diseases

(i) Bacterial Diseases

Disease	Pathogen	Transmission
Dysentery	Shigella	Contact, Contaminated food and water
Plague	Pasteurella pestis	Rat fleas
Diphtheria	Corynebacterium diphtheriae	Contaminated food, Direct contact
Cholera	Vibrio cholerae	Food & water contaminated with faeces
Tuberculosis	Mycobacterium tuberculosis	Droplets from patient/carrier
Tetanus	Clostridium tetani	Contamination of wound by bacteria
Whooping cough	Bordetella pertussis	Contact, Droplets
Leprosy	Mycobacterium leprae	Direct contact
Anthrax	Bacillus anthracis	Contact with cattle
Weil's disease	Leptospira	Contact with rodents, dogs, etc.

(ii) Viral Diseases

Disease	Pathogen	Transmission
Rabies	Rabies virus	Rabid dogs.
Dengue	Dengue virus	Aedes mosquito
Influenza	Influenza virus	Coughing & sneezing

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Measles	Rubeola virus	Droplets
German measles	Rubella virus	Close contact
Mumps	Mumps virus	Air borne droplets
Chicken pox	Varicella zoster	Air borne droplets
Small pox	Variola virus	Direct contact
Polio	Polio virus	Faeces & Air
Chikungunya	CHIK virus	Aedes mosquito
Avian flu	H5N1 virus	Contact with infected poultry. Air borne spread
H1N1 (Swine flu)	H1N1 virus	Contact with pigs, cough & sneeze of infected person.

Prevention and Control of Diseases

1. Personal Hygiene : Keep the body clean. Use clean drinking water, food, etc.

2. Public Hygiene

- (a) Proper disposal of wastes and excreta.
- (b) Periodic cleaning and disinfection of water reservoirs, pools, cesspools and tanks,
- (c) Avoid contact with infected persons or their belongings (to control air-borne diseases).
- (d) Standard practices of hygiene in public catering.
- (e) Control and eliminate the vectors (*e.g.* mosquitoes) and their breeding places by following methods:
 - (i) Avoid stagnation of water.
 - (ii) Regular cleaning of household coolers.
 - (iii) Use of mosquito nets.
 - (iv) Introduce larvivorous fishes like Gambusia in ponds
 - (v) Spraying insecticides in ditches, drainage and swamps.
 - (vi) Doors and windows should be provided with wire mesh to prevent entry of mosquitoes.
- > These precautions can avoid vector borne diseases like Malaria, Filariasis, Dengue and Chikungunya.
- Immune System
 - It is the system that gives immunity to the body by recognizing, responding and remembering foreign antigens.
 - It plays an important role in allergic reaction, auto-immune disease and organ transplantation.
 - It includes lymphoid organs, tissues, cells and soluble molecules like antibodies.
- Lymphoid Organs
 - These are the organs where origin, maturation and proliferation of lymphocytes occurs.
 - These are of two types namely, primary lymphoid organs and secondary lymphoid organs.
- (a) Primary Lymphoid Organs
 - Here, immature lymphocytes differentiate into antigen-sensitive lymphocytes e.g. Bone marrow and thymus.
 - Bone marrow is the main lymphoid organ and is the site of formation of all the blood cells including lymphocytes.
 - Thymus is large during birth but gradually reduces in size and becomes very small size in puberty.
 - Growth and maturation of T-lymphocytes taken place here.

(b) Secondary Lymphoid Organs

- The organs to which matured lymphocytes migrate, interact with antigens and then proliferate to become effector cells *e.g.* Spleen, lymph nodes, tonsils, Peyer's patches, MALT and appendix. Secondary lymphoid organs are:
- (i) Spleen :
 - (i) It is a bean-shaped organ.
 - (ii) It contains lymphocytes and phagocytes.
 - (iii) It removes worn-out RBCs and microorganisms from blood.
 - (iv) It is a reservoir of erythrocytes in foetus.
- (ii) Lymph Nodes
 - (i) These are found in lymphatic system.
 - (ii) They trap microorganisms or other antigens that enter the lymph and tissue fluid.
 - (iii) The trapped antigens activate lymphocytes and cause immune response.

(iii) Mucosa Associated Lymphoid Tissue (MALT) :

- It is located within the lining of respiratory, digestive and urinogenital tracts.
- (ii) It constitutes 50% of lymphoid tissue in human body.

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> Immunity

- It is the ability of the immune system of the body to fight against the disease-causing organisms.
- It is of two types namely Innate immunity and Acquired immunity.

(a) Innate Immunity

- It is the *non-specific* defense present at the time of birth.
- It provides barriers to the entry of foreign agents into our body.
- It consists of four types of barriers :

(i) Physical Barriers

- Skin on our body is the first and main barrier which prevents entry of the micro-organisms. It is the first line of defence.
- Mucus coating of the epithelium lining the respiratory, gastrointestinal and urogenital tracts also help in trapping microbes entering our body.
- (ii) **Physiological Barriers :** Acid in the stomach, saliva in the mouth, tears from eyes–all prevent microbial growth.
- (iii) Cellular Barriers : Certain types of leukocytes (WBC) of our body like polymorpho-nuclear leukocytes (PMNL-neutrophils) and monocytes and natural killer (type of lymphocytes) in the blood as well as macrophages in tissues can phagocytose and destroy microbes.
- (iv) Cytokine Barriers : Virus infected cells secrete proteins called *interferon* which protect non-infected cells from further viral infection.

(b) Acquired Immunity

- It is a pathogen specific immunity.
- It is not present since birth but develops during the life time of an individual.
- It is characterized by memory *i.e.* during first encounter of a pathogen; our body produces primary response in low intensity. Second encounter with the same pathogen produces a secondary (anamnestic) response in high intensity.
- The primary and secondary immune responses are carried out with B-lymphocytes and T-lymphocytes.
 (a) B-lymphocytes (B-cells) : Produce antibodies.
 - (b) T-lymphocytes : Help B-cells to produce antibodies.
- > Structure of an Antibody Molecule
 - Each antibody has 4 polypeptide chains namely, 2 small light chains and 2 large heavy chains (H₂L₂).
 - In our body different types of antibodies : Such as IgG, IgA, IgM, IgE & IgD are produced.
 - Acquired immune response is of two types namely humoral mediated response and cell mediated response. (a) Humoral or Amibody Mediated Response/Antibody Mediated Immunity (AMI)
 - Antibodies are found in blood plasma. So, it is called as humoral immune response.
 - It includes b-lymphocytes and T-lymphocytes. The latter help the former to produce antibodies.
 - (b) Cell Mediated Response/Cell Mediated Immunity (CMI)
 - It is T-lymphocytes (T-cells) mediated (CMI).
 - CMI causes Graft rejection.
 - The body is able to differentiate 'self' and 'non-self'.
 - Tissue matching and blood group matching are essential before undertaking any graft / transplant. After this, the patient has to take immune-suppressants for all his life.
- > Acquired immunity is of two type *i.e.* Active and Passive Immunity.
 - (a) Active Immunity
 - The immunity in which antibodies are produced in a host body when the host is exposed to antigens (*e.g.* living or dead microbes or other proteins) is known as active immunity.
 - It is a slow process.
 - It is produced by 2 ways :
 - (a) Natural Active Immunity : During natural infection by microbes.
 - (b) Artificial Active Immunity : Injecting the microbes deliberately during immunization.
 - (b) Passive Immunity :
 - Here, readymade antibodies are directly given to protect body.
 - It is of two types :
 - (a) Natural Passive Immunity : *e.g.* Antibodies (IgG) from mother \rightarrow Placenta \rightarrow Foetus \rightarrow Antibodies (IgA) in colostrum \rightarrow infants.
 - (b) Artificial Passive Immunity : e.g. Anti-tetanus serum (ATS).

> Immunization

- This is based on 'memory' of the immune system.
- It is of two types namely active immunization and passive immunization.

(a) Active Immunization (Vaccination)

- A preparation of vaccine (antigenic proteins of pathogen or inactivated pathogen) is introduced into body.
- The antibodies produced in the body against the antigens neutralize the pathogenic agents during actual infection.
- The vaccines also generate memory B and T-cells that recognize the pathogen quickly *e.g.* Polio vaccine, Hepatitis B vaccine, DPT vaccine etc.
- Vaccines are produced using DNA recombinant technology (*e.g.* Hepatitis B vaccine produced from Yeast). Such vaccines are called as second generation vaccines.
- The vaccines produced by conventional methods *e.g.* small pox-vaccines are called first generation vaccine and those which are synthetic vaccine are the third generation vaccine.

(b) Passive Immunization

It is the direct injection of pre-formed antibodies or antitoxin. It is for quick immune response *e.g.* Immunization against Tetanus, snake venom, etc.

> Allergies

- It is the exaggerated or hypersensitive response of the immune system to certain antigens present in the environment.
- Allergens are substances causing allergy e.g. mites in dust, pollens, animal dander, fur, etc.
- Antibodies produced against the allergens are of IgE type.
- Allergy is due to the release of chemicals like histamine and serotonin from the mast cells.
- **Symptoms :** Sneezing, watery eyes, running nose, difficulty in breathing, etc.
- Determination of cause of allergy : The pattent is exposed to or injected with very small doses of possible allergens and the reactions studied.
- Treatment, Drugs like anti-histamine, adrenatine and steroids quickly reduce the symptoms of allergy.
- Modern-day life style results lowering of immunity and more sensitivity to allergens.
- Asthma is a respiratory disease due to allergy.

> Auto Immunity

- It is caused due to genetic and other unknown reasons. Body attacks self cells. This results in auto-immune disease.
- It is memory-based acquired immunity evolved in higher vertebrates based on the ability to differentiate foreign organisms (e.g. pathogens) from self-cells *e.g.* Rheumatoid arthritis.

> AIDS (Acquired Immunodeficiency Syndrome)

- Syndrome is a group of symptoms.
- AIDS is the deficiency of immune system.
- It is caused by HIV (Human Immunodeficiency Virus), a retrovirus having RNA genome.
- AIDS was first reported in America (1981).
- Mode of Transmission :

(a) Sexual contact with infected person.

(b) Transfusion of contaminated blood and blood products.

- (c) Sharing of infected needles.
- (d) From infected mother to her child through placenta.

High risk of getting HIV includes

(a) Individuals with multiple sexual partners.

- (b) Drug addicts who take drugs intravenously using infected syringes.
- (c) Individuals who require repeated blood transfusion.
- (d) Children born to an HIV infected mother.
- > HIV does not spread by touch or physical contact.
 - It spreads only through body fluids.
 - There is always a time-lag (from few months to 5-10 years) between the infection and appearance of symptoms.

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- Life Cycle of HIV Virus :
 - HIV enters into body → To macrophages (acts as HIV factory) → RNA genome replicates in presence of *Reverse transcriptase* to form viral DNA → Viral DNA incorporates into host DNA → Infected cells produce virus particles → HIV enters into helper T-cells (T_H) → Replicates and produce progeny viruses → Attack other helper T-cells → T-cells decrease → Weaken immunity.
 - HIV infected person may be infected with Mycobacterium, viruses, fungi and parasites like Toxoplasma.
- Diagnosis of AIDS : ELISA test (Enzyme-linked immune-sorbent Assay) PCR-Test, western blotting, etc.
- Treatment of AIDS
 - Anti-viral drugs partially effective.
 - They can only prolong the life of the patient.
- Prevention of AIDS
 - Educate peoples about AIDS.
 - Making blood (from blood banks) safe from HIV.
 - Use of disposable needles and syringes.
 - Advocating safe sex and free distribution of condoms.
 - Controlling drug abuse.
 - Regular check-ups for HIV in susceptible population.
- Cancer
 - Cancer is an abnormal and uncontrolled multiplication of cells resulting in the formation of tumor (masses of cells).
 - Normal cells show a contact inhibition (contact with the other cells inhibits their uncontrolled growth). Cancer cells do not have this property.
 - Tumors are of two types namely Benign tumor and Malignant tumor.
 - (a) Benign Tumor
 - It is confined to the place of its origin and do not spread to other parts of the body.
 - It is harmless or causes less damage to the body.
 - (b) Malignant Tumor
 - It spread and invades nearby tissues/
 - It is harmful.
 - Metastasis : The spread of cancer cells from one part of the body to another.
- > Types of Cancer
 - Carcinoma : cancer of epithelial cells.
 - Sarcoma : cancer of connective tissues.
 - Melanomas : cancer of melanocytes.
 - Leukemia : blood cancer.
 - Lymphomas : cancer of spleen and lymph nodes.
- Causes of Cancer (Carcinogens)
 - (a) Physical agents : e.g. Ionizing radiations like X-rays and gamma rays and non-ionizing radiations like UV.
 - (b) Chemical agents : Tobacco smoke (major cause of lung cancer), vinyl chloride, caffeine, nicotine, mustard gas, etc.
 - (c) Biological agents : *e.g.* oncogenic viruses, cellular oncogenes (c-onc or proto oncogenes), etc. When C-onc in normal cells is activated the cells becomes oncogenic.
- Cancer Detection and Diagnosis
 - (a) **Biopsy**: A thin piece of the suspected tissue is stained and examined under microscope (histopathological studies).
 - (b) In case of leukemia : Biopsy and histopathological studies. Blood and bone marrow tests for increased cell counts.
 - (c) Radiography (use of X-rays) : CT (Computerized tomo-graphy) scan and MRI (Magnetic Resonance Imaging).
 - (d) Use of Antibodies against cancer-specific antigens.
 - (e) Techniques of molecular biology to detect genes related to cancer. Such individuals may be advised to avoid exposure to particular carcinogens (*e.g.* tobacco smoke).
- Treatment of Cancer

Most cancers are treated by combination of surgery, radiotherapy and chemotherapy.

(a) Radiation therapy : Tumor cells are irradiated lethally without damaging surrounding normal tissues.

- (b) Chemotherapy : Use of chemotherapeutic drugs. Many drugs have side effects like hair loss, anaemia, etc.
- (c) Immunotherapy : The patients are given biological response modifiers (*e.g.* ∝- interferon) which activates their immune system and helps in destroying the tumor.

IMPORTANT DIAGRAMS:



Fig 8.2: Structure of an antibody molecule



- · Learn name of diseases and write biological names with correct spellings according to the rules of binomial nomenclature.
- Q. 2. Retroviruses have no DNA. However the DNA of the infected host cell does possess the viral DNA. How is it possible?

E & A [Outside Delhi Set-I, 2015]

- Ans. After infecting the host cell, the viral RNA undergoes reverse transcription in the presence of an enzyme reverse transcriptase as a result of which viral DNA is formed. This DNA then gets incorporated into infected host DNA. 1
- Q. 3. How do monocytes act as a cellular barrier in humans to provide innate immunity?

U [Delhi/Outside Delhi, Comptt, Set 1, 2018]

In what way is monocyte a cellular barrier with

[Delhi Set-II, Comptt. 2015]

(1 mark each)

Ans. Phagocytosis of microbes / destroy microbes. [CBSE Marking Scheme, 2018]

Monocytes are motile and phagocytic leucocytes. They destroy microbes / engulfs and destroys the antigen / microbes and constitute cellular barriers of innate immunity. 1

Q. 4. How do cytokinin barriers provide innate immunity in humans?

U [Outside Delhi/ Delhi, 2018] OR

How do cytokine barriers help in evading viral infections ? [Delhi Set-III, Comptt. 2015]

Ans. Interferon (proteins), secreted by virus infected cells (protect non-infected cells from further viral $\frac{1}{2} + \frac{1}{2}$ infection).

[CBSE Marking Scheme, 2018]

Detailed Answer:

Virus infected cells secrete proteins called interferons, which are low molecular weight proteins and act as cytokine barriers. They protect non-infected cells from further infection.

- **Ans.** Thymus provides micro-environment for the development and maturation of T-lymphocytes, its degeneration will weaken the immune system so the child will be prone to frequent infections.

[CBSE Marking Scheme, 2015] 1

Commonly Made Error

• Many students fail to write the correct explanation.

Answering Tip

- Learn the roles of various lymphocytes emphasizing on operative terms.
- Q. 6. Why is colostrum a boon to the newborn baby ?

U [Outside Delhi Set, 2015]

Ans. Colostrum (Mother's first milk) contains good amount of antibodies like IgA, which provide passive immunity to the new born and protects it from various infections.

Answering Tip

- Familiarise students with technical terms like colostrum, passive immunity, active immunity, antibodies, etc.
- Q. 7. Name two types of cells which act as 'cellular barriers' to provide innate immunity in humans. R [Delhi Set-I, 2014]
- Ans. (i) Polymorpho nuclear leucocytes (neutrophils).(ii) Monocytes–A kind of lymphocyte.1
- Q. 8. What is an autoimmune disease?

[Foreign, 2014]

U [Outside Delhi Comptt. 2017, Set - III]

What is an autoimmune disease ? Give an example. [Foreign Set-I, 2014]

- Ans. Autoimmune disease is a condition of the body in which the immune system of the body attacks self cells *e.g.* rheumatoid arthritis.
- Ans. Gambusia is a type of fish that preys upon the larvae of mosquitoes. It is therefore introduced into drains and ponds to feed on mosquito larvae / to eliminate the vectors responsible for causing malaria. It thus helps in controlling malaria. [CBSE Marking Scheme, 2014] 1
- Ans. Hemozoin is a toxic substance released by rupturing of RBCs in to blood during malarial

infection. It causes chill and high fever, recurring every 3 - 4 days / in cyclic manner. $\frac{1}{2} + \frac{1}{2}$ [CBSE Marking Scheme, 2014]

- Q. 11. Why is secondary immune response more intense than the primary immune response in humans ? U [Outside Delhi Set-I, 2014]
- Ans. Body will have memory B cells of the first encounter / presence of antibodies developed during primary immune response. 1

[CBSE Marking Scheme, 2014]

Commonly Made Error

- Students get confused between primary immune response and secondary immune response. They write irrelevant stories.
- Q. 12. Name the two intermediate hosts which the human liver fluke depends on to complete its life cycle so as to facilitate parasitization of its primary host.
- Ans. Terrestrial snath and fish are two intermediate hosts on which the human liver fluke depends to complete its life cycle so as to facilitate parasitization of its primary host. 1

[CBSE Marking Scheme, 2014]

Q. 13. When does a human body elicit an anamnestic response ?

A [Outside Delhi Set-I, II, III, 2013, 2011]

- as. Anamnestic response is the secondary response which is elicited when our body encounters with the same antigen to which the body has previously encountered.
- Q. 14. Why sharing of injection needles between two individuals is not recommended ?

R [Delhi Set-I, 2013]

- Ans. Sharing of injection needles is not recommended so as to avoid the transmission of STDs like AIDS and Hepatitis from the diseased person to the healthy person.
- Ans. Spleen is the secondary lymphoid organ that stores lymphocytes, it filters blood by trapping blood borne microbes by phagocytes and lymphocytes. It also acts as a large reservoir to store erythrocytes.
 (Any two) ½ + ½

[CBSE Marking Scheme, 2012]

AI Q. 16. How does malaria differ from chikungunya with reference to their vectors.

[Outside Delhi Set, Comptt. 2010]

Ans. The vector of malaria is *Anopheles* mosquito while that of chikungunya is *Aedes* mosquito. 1

Commonly Made Error

• Students get confused between vectors of malaria and chikungunya. They write opposite answers.

Answering Tip

• Learn names of diseases and their vectors, with correct spellings.

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HUMAN HEALTH AND DISEASES

Q. 17. Name the category of disease in which 'Rheumatoid arthritis' in human is put under.

R [Outside Delhi Comptt. 2017, Set - II]

Ans. Auto-immune disease. 1 [CBSE Marking Scheme, 2017]

Q. 18. Name the condition in vertebrates where the body attacks self-cells.

A [Outside Delhi Comptt. 2017, Set - I]

Ans. Auto immune disorder or auto-immune disease.

[CBSE Marking Scheme, 2017]

Q. 19. Suggest a method to ensure an anamnestic response in humans.

A [Delhi - 2017, Set - I, II, III]

Ans. Vaccination or Immunization (Active / passive) or weakened or inactive microbes or pathogens or proteins or antibodies introduced into the host body. 1

[CBSE Marking Scheme, 2017]

- Q. 20. Name the stage of *Plasmodium* that gains entry into the human when bitten by an infected female *Anopheles.* R [Delhi Comptt. 2017, Set I]
- Ans. Sporozoites.
- [CBSE Marking Scheme, 2017] 1
- Ans. Sporozoites attack liver cells. 1/2 Sporozoites reproduce asexually in liver cells bursting them and then reach RBC. 1/2 [CBSE Marking Scheme, 2017]

Commonly Made Error

- Many students misplaced the terms and hence could not write the correct logical sequence.
- Q. 22. A patient is down with *Amoebiasis*. List the symptoms that confirm this infection. Name the causative pathogen. [A] [Delhi Set-I, Comptt. 2015]

Ans. Constipation, abdominal pain, stools with mucous, blood clot.

Entamoeba histolytica. $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$ [CBSE Marking Scheme, 2015]

Commonly Made Error

- Students often write incorrect spelling of causative pathogen. Symptoms are either missed or written incorrectly.
- Q. 23. Name two intermediate hosts which the human liver fluke depends on to complete its life cycle so as to facilitate parasitization of its primary host.

R [Delhi Set-II, 2014]

- **Ans. (i)** Snail (ii) Fish. $\frac{1}{2} + \frac{1}{2}$
- Q. 24. State the function of mast cells in allergy response.
 - R [Foreign Set, 2013]
- Ans. The chemicals like histamine and serotonin are released from mast cells. These chemicals cause exaggerated response of immune system called allergy response.
- Q. 25. Some allergens trigger sneezing and wheezing in human beings. What causes this type of response by the body ?

R [Delhi, 2009]

Ans. Such type of response by the body is due to the exaggerated action of its immune system to certain antigens or allergen present in the environment.

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A Q. 26. It was diagnosed by a specialist that the immune system of the body of a patient has been suppressed. Name the disease the patient is suffering and its causative agent.

U [Delhi, 2007]

(2 marks each)

Ans. The name of such a disease is AIDS (Acquired Immunodeficiency Syndrome) and it is caused by HIV (Human Immunodeficiency Virus). 1

Answering Tip

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• Learn the symptoms, its mode of transmission, diagnosis, etc. of all diseases mentioned in chapter.

Short Answer Type Questions-I

- Q. 1. (i) Name any two helminths which are known to be pathogenic to human.
 - (ii) List two symptoms of the diseases caused by any one of them.

R [Delhi Set-I, II & III, Comptt., 2016]

Ans. (i) Ascaris, Wuchereria ½+½=1
(ii) Symptoms-internal bleeding, muscular pain, fever, anaemia, blockage of the internal

passage (any two) / chronic inflammation of the organs, deformities in genital organs. $\frac{1}{2}+\frac{1}{2}=1$

[CBSE Marking Scheme, 2016]

Detailed Answer :

- (i) Two helminths pathogenic to humans are :
 - (a) Ascaris–Causing ascariasis disease in humans.
 (b) Wuchereria bancrofti & W. malayi causing Filariasis or elephantasis in humans.

Symptoms of Ascariasis : Internal bleeding, muscular pain, anaemia, blockage of intestinal passage.

Symptoms of Filariasis : Chronic inflammation of lymphatic vessels of lower limbs and gross deformities of genital organs.

Commonly Made Error

• Students often write the causative agents without following Binomial Nomenclature. Spellings are incorrect in several cases. Symptoms are either missed or written incorrectly.

Answering Tip

- Stress upon the importance of writing scientific names correctly according to Binomial Nomenclature. Symptoms and preventive measures should also be discussed.
- Q. 2. Name any two secondary lymphoid organs in a human body and state the function of any of them. [] [Outside Delhi Set-I & III, Comptt., 2016]
- **Ans.** Spleen, lymph nodes, tonsils, Peyer's patches of small intestine, vermiform appendix.

(Any two) $\frac{1}{2} + \frac{1}{2}$

They act as sites for interaction of lymphocytes with the antigen and cause immune response. **Function : Spleen :** Trap blood-borne microorganisms and worn out RBCs, thus filters blood **Lymph nodes :** Trap the microorganisms antigens (which happen to get into the lymph and tissue fluid). The trapped antigens activate lymphocytes and cause immune response. **1**

[CBSE Marking Scheme, 2016]

Commonly Made Error

• Students get confused between primary and secondary lymphoid organs.

Answering Tip

- Charts and interactive boards can be used to learn the names and function of primary and secondary lymphoid organs.
- Q. 3. How are oncogenic viruses different from protooncogenes?

U [Outside Delhi Set-I, Comptt. 2016]

Ans. Oncogenic viruses are cancer causing viruses / external cancer causing factor.

Proto-oncogenes: Identified in normal cells which when activated (under certain condition) could lead to oncogenic transformation of cells / internal cancer causing factor. 1+1=2

R [CBSE Marking Scheme, 2016]

AI Q. 4. (i) Which organ of the human body is initially affected when bitten by an infected female *Anopheles?* Name the stage of the parasite that infects this organ.

(ii) Explain the events that are responsible for chill and high fever in the patient.

[Outside Delhi Set-I, Comptt., 2016]

Ans. (i) Liver cells, sporozoites. $\frac{1}{2}+\frac{1}{2}=1$ (ii) Parasites reproduce asexually in RBC / multiply, Rupture of RBCs is associated with release of toxic substance called as hemozoin. $\frac{1}{2}+\frac{1}{2}=1$

[CBSE Marking Scheme, 2016]

Detailed Answer :

The infected female *Anopheles* is the carrier of malarial parasite called *Plasmodium*. When bitten by this carrier the liver is initially affected. The infective stage of *Plasmodium* is sporozoite which is injected into the blood by female anopheles. From blood, the sporozoites reach the liver cells where they multiply in liver cells. The liver cells rupture and liberate the parasite in blood where they attack RBCs, multiply and cause their rupture. Rupture of RBCs is associated with the release of a toxin called as hemozoin, which causes chill and high fever recurring every 3-4 days.

 Name the cells HIV (Human Immunodeficiency Virus) gains entry into after infecting the human body. Explain the events that occur in these cells.

R [Outside Delhi Set-I, 2016 & Set - III - 2017]

Ans. HIV (Human immune deficiency virus) enters into **macrophages** after getting in human body. HIV multiplies first in macrophages and then in helper T cells or lymphocytes.

Events that occur in the human host after the entry of HIV :

- (i) After entering the human body, the HIV virus attacks and enters the macrophages.
- (ii) Inside the macrophages, the RNA of the virus replicates with the help of enzyme reverse **transcriptase** and give rise to viral DNA.
- (iii) Then, this viral DNA incorporates into the host cell DNA, uses raw materials and infected cell machinery and directs the synthesis of virus particles.
- (iv) At the same time, HIV enters the helper T-lymphocytes, replicates and produce progenies.
- (v) As a result, T-lymphocytes start decreasing in number and immune response of the person becomes weak. 1+1=2
 [CBSE Marking Scheme, 2016]

Q. 6. List the symptoms of Ascariasis. How does a healthy person acquire this infection ?

U [Outside Delhi Set-I, II, III, 2014]

Ans. Ascariasis is a helminthic disease caused by common round worm - *Ascaris lumbricoides*. The main symptoms of ascariasis are muscular internal bleeding, muscular pain, anaemia, blockage of intestinal passage. (Any three) 1½
By intake of water, vegetables, fruits, foods contaminated with the eggs of parasite excreted along with faeces of infected person.

[CBSE Marking Scheme, 2014] 1/2

Q. 7. Name the type of immunity the colostrum provides to a newborn baby. Write giving an example where this type of immunity should be provided to a person. U [Outside Delhi, Set - II, 2017]

Ans. Passive Immunity 1 In case of infection by deadly microbes (tetanus) or snake bite where quick immune response is required. 1 [CBSE Marking Scheme, 2017]

Detailed Answer :

When ready made antibodies are directly given to protect the body against foreign agents, it is called passive immunity.

To neutralize snake venom or deadly microbe infection (tetanus), quick immunity should be provided to a person.

OR



Commonly Made Error

• Instead of passive immunity, students write active immunity. They get confused between the two.

Answering Tip

- Learn the differences between passive and active immunity in a tabular form along with examples for better understanding and retention.
- Q. 8. Name the type of immunity a baby is born with. How is it different from the one he gets from the mother's milk after birth ?

U [Delhi Comptt. 2017, Set - I, II]

Ans. Innate Immunity, Acquired Immunity that a baby acquires from his mother's milk after birth is an example of passive Immunity 1 + 1
[CBSE Marking Scheme, 2017]

Detailed Answer :

Innate immunity is present at the time of birth. Innate immunity is different from the immunity that a baby get from mother's milk after birth because immunity acquired from mother's milk is acquired or passive immunity.

Q. 9. State the role of T-lymphocytes and B-lymphocytes in developing acquired immunity against certain diseases.

R [Outside Delhi Set-I, II, Comptt. 2013]

Ans. The cells responsible for producing the acquired immune response in human body are two special types of lymphocytes called as T-lymphocytes and B-lymphocytes.

T-lymphocytes help B-lymphocytes to produce antibodies or CMI (cell mediated immunity). B-lymphocytes produce antibodies into blood to fight antigens. 1 + 1

A Q. 10. How does a vaccine for a particular disease immunize the body against that disease ?

U [Delhi Set-I, Comptt. 2013] OR

OK

Write the events that take place when a vaccine for any disease is introduced into the human body. [Outside Delhi Set-I, 2013]

OR

Why a person with cuts and bruises following an
accident is administered tetanus antitoxin ? Give
reasons.[Outside Delhi Set-I, 2013]

OR

What is a vaccine ? How do they act to provide long term immunity to an individual who is vaccinated ?

[Delhi Comptt. 2017, Set - II]

Ans. Vaccine is an antigen protein of pathogens or inactivated or weakened pathogens or their toxin. When it is introduced into the body of a person who is required to be made immune, it stimulates the production of antibodies and memory cells which is called primary response. It produces memory cells when this pathogen enters second time. These memory cells show rapid and massive responses so that body become immune to this pathogen.

Q. 11. A patient showed symptoms of constipation, abdominal pain and stools with excess mucous and blood clots. Name the disease and its pathogen. Where do these pathogens live in the victim's body ?

Name the mechanical carrier that transmits this parasite.

A [Outside Delhi Set-I, II, Comptt. 2013] Ans. Disease – Amoebiasis.

Pathogen – Entamoeba histolytica.The pathogen resides in the large intestine.Carrier– Houseflies. $\frac{1}{2} \times 4 = 2$

Answering Tip

- While learning diseases, all the possible methods of diagnosis and treatment and the characteristic symptoms should be learned properly.
- Q. 12. (i) Highlight the role of thymus as a lymphoid organ.
 - (ii) Name the cells that are released from the above mentioned gland. Mention how they help in immunity.
 [Delhi Set-I, 2012]
- Ans. (i) The thymus is a primary lymphoid organ which is a component of immune system in the body. Here the immature lymphocytes differentiate into mature lymphocytes and become antigen sensitive in thymus.
 - (ii) T- lymphocytes are released from thyrnus. T-cells themselves do not secrete antibodies but help B-cells to produce antibodies and provide cell-mediated immunity (CMD). 1

[CBSE Marking Scheme, 2012]

Q. 13. Explain the impact of removal of thymus gland on the immune system of a human body.

A [CBSE SQP, 2018]

Ans. The thymus provides mcro-environments for the development and maturation of T-lymphocytes. The T-cells themselves do not secrete antibodies but they help B cells to produce them. Therefore, the immunity will be reduced. 1/2 x 4 [CBSE Marking Scheme, 2018]

Answering Tip

- The answer should be crisp and precise. Keywords should be highlighted in explanation.
- Q. 14. Name the two special types of lymphocytes in humans. How do they differ in their roles in immune response ?

R [Outside Delhi Set-II, 2012]

Ans.B-lymphocytes, T-lymphocytes are the two special
types of lymphocytes. $\frac{1}{2} + \frac{1}{2}$ B-cells produce pathogen specific antibodies and
provide humoral immune response. $\frac{1}{2}$ T-cells help the B-cells to produce antibodies to
fight with the pathogens and are responsible for
cell mediated immunity. $\frac{1}{2}$

[CBSE Marking Scheme, 2012]

Q. 15. Name the parasite that causes filariasis in humans. Mention its two diagnostic symptoms. How is this disease transmitted to others ?

R [Delhi Set-II, 2012]

Ans. Filariasis is caused by two types of parasitic worms: *Wuchereria bancrofti* and *Wuchereria malayi*.

Symptoms : Chronic inflammation of the lymphatic vessels of the lower limbs and gross deformities of genital organs.

This disease is transmitted through the bite of female mosquito vectors, *i.e., Culex* mosquito.

 $\frac{1}{2} + 1 + \frac{1}{2} = 2$

Q. 16. Name any two organisms that are responsible for ringworms in humans. Mention two diagnostic symptoms. Name the specific parts of the human body where these organisms thrive and explain why?

R [Outside Delhi Set-II, 2012]

- (i) Name any two causative organisms responsible for ring worm.
- (ii) State any two symptoms of the disease.

[Delhi Set-I, Comptt. 2016]

Ringworm is caused by fungi Trichophyton and Epidermophyton and Microspermum.

Dry, scaly lesions appears on the body. These lesions are accompanied by intense itching.

The pathogen thrive in skin folds, nails and groins because the heat and moisture are favourable at these regions. 2

Q. 17. Name the cells that act as HIV factory in humans when infected by HIV. Explain events that occur in the infected cell.

R [Outside Delhi Set-III, 2012]

Ans. Macrophages / Helper T-cells act as HIV factory.

The virus enters macrophages or helper T-cells where RNA genome of the virus replicates to form viral DNA with the help of the enzyme reverse transcriptase. The viral DNA then gets incorporated into host cell's DNA and directs infected cells to produce virus particles. The macrophages continue to produces virus particles. Simultaneously the virus enters the helper T-cells where it replicates and form progeny viruses. Progeny viruses released in the blood attack other helper T-cells with the result these member goes on decreasing in the infected person. Due to the fall in their number, the antibodies are not produced by B-lymphocytes to fight with the pathogen / antigens, which results in the infected person becoming immunodeficient and he is not able to protect himself from any type of infection. 1 + 1 = 2

Q. 18. How do interferons protect us ?

R [Outside Delhi Set-III, 2012]

Ans. Interferons are antiviral agents produced by virus infected cells and can fight tumors. The virus-infected cells stimulate neighbouring cells to release

antiviral proteins by releasing interferons. Thus, interferons protect non-infected cells from further viral infections by creating cytokine barriers. 2

Q. 19. Name the two types of immune systems in a human body. Why are cell mediated and humoral immunities so called ?

R [Delhi Set-I, 2011]

Ans. Two types of immune systems in a human body are acquired and innate. 1

Cell mediated immunity is called so because cells like T-lymphocytes provide immunity / T-cells kill or destroy the antigens.

Humoral immunity or antibody mediated immunity is called so because it consists of antibodies that are present in humours or body fluids such as plasma, lymph and external secretions whereas cell-mediated immunity is provided by B-cells and T-cells. $\frac{1}{2} + \frac{1}{2} = 1$ [CBSE Marking Scheme, 2011]

Commonly Made Error

- Most of the students misunderstood humoral and cell-mediated immunity for active and passive immunity and defined them accordingly.
- Some candidates simply wrote *produced antibodies and did not produce antibodies* without mentioning *T cells* and *B cells*.

Answering Tip

- Give an outline classification of immunity on different bases, for example, (i) humoral and cell mediated (ii) active and passive and (iii) natural and acquired, etc. Learn each term with example.
- Q. 20. Identify A, D, E and F in the diagram of an antibody molecule given below:



Ans.A-antigen binding site.B-variable region.C-constant region.D-light chain.E-heavy chain (constant region).F-disulphide bond. $\frac{1}{2} \times 4 = 2$ [CBSE Marking Scheme, 2011]

Commonly Made Error

- Instead of heavy and light 'chains', some students write heavy and light 'bands'. Instead of disulphite bonds, many write sulphate and sulphite bonds.
- Q. 21. Why is the structure of an antibody molecule represented as H_2L_2 ? Name any two types of antibodies produced in a human body.

[Delhi/Outside Delhi, Comptt, Set 1, 2018]

Ans. L_2 = Two light / small polypeptide chains, H_2 = two heavy / longer polypeptide chains. $\frac{1}{2} \times 2$

IgA/IgM/IgE/IgG. (Any two) $\frac{1}{2} \times 2$

[CBSE Marking Scheme, 2018]

Q. 22. The figure given below represents a molecule present in the body of a mammal –



- a) Name the parts labeled 'a' and 'b' in the molecule shown above.
 - b) Name the type of cells that produce this molecule.

[CBSE SQP, 2018]

Ans. a)a- Antigen binding site.
b- Light chain. $\frac{1}{2} + \frac{1}{2}$ b)B-lymphocytes (B- cells).1

[CBSE Marking Scheme, 2018]

Q. 23. Write the scientific names of the causal organisms of elephantiasis and ringworm in humans. Mention the body parts affected by them.

U [Delhi Set-I, 2011]

- Ans. Elephantiasis is caused by *Wuchereria bancrofti* and *Wuchereria malayi*. Legs/scrotum/lymphatic vessels or lower limb. 1/2 + 1/2 Ringworm is caused by *Trichophyton / Microsporum*
 - / *Epidermophyton*, Skin, nails and scalp. $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2011]

Q. 24. Name the bacterium that causes typhoid. Mention two diagnostic symptoms. How is this disease transmitted to others ?

R [Outside Delhi Set-III, 2011]

Ans. Salmonella typhi. ½ Constipation, stomach pain, headache, weakness, loss of appetite, high fever. (Any two) ½ + ½

The disease is transmitted through contaminated food or water. 1/2

[CBSE Marking Scheme, 2011]

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Commonly Made Error

• Students often mis-spell the biological name of *Salmonella* e.g. Selmonala, Semlonala etc. Some Students write only the generic name. Many of them forget to write the scientific name, according to the rules of Binomial nomenclature.

Answering Tips

- Teach students pathogens of diseases and to write biological names with correct spellings according to the rules of binomial nomenclature.
- Q. 25. How is an allergic reaction caused by an allergen ? Name a drug that can reduce the symptoms of allergy.

R [Outside Delhi Comptt. 2011]

- Ans. (i) Allergy is due to the release of chemicals like histamine and serotonin from the mast cells. Common examples of allergens are mites in dust, pollens, animal dander etc.
 - (ii) The use of drugs like anti-histamine, adrenaline and steroids quickly reduces the symptoms of allergy. 1 + 1 = 2
- Q. 26. State the functions of primary and secondary lymphoid organs in humans.

U [Delhi Set-I, II, III, 2011]

- Ans. (i) Bone marrow is the main lymphoid organ where all types of blood cells including lymphocytes are formed.
 - (ii) The lymphocytes migrate to secondary lymphoid organs (*e.g.* spleen, lymph nodes, Peyer's patches of small intestine), which interact with the antigen and proliferate to form a clone. 1 + 1 = 2
- Q. 27. List any two emergent circumstances when a medical doctor would recommend injection of a preformed antibody into the body of a patient and why?

U [Delhi Comptt. 2011]

- Ans. (i) If a person is infected with some deadly microbes, a quick immune response is required as in tetanus, we need to directly inject the preformed antibodies or antitoxin.
 - (ii) Even in case of snake bites, the injection given to the patients contains preformed antibodies against the snake venom.

This type of immunization is called passive immunization. 1 + 1 = 2

Q. 28. Differentiate between benign and malignant tumours.

U [Delhi Set-II, 2011]

Ans.

Benign tumours	Malignant tumours		
Non-cancerous.	Cancerous.		
Remains confined <i>i.e.</i> non-invasive.	Spreads to other parts of the body.		
No metastasis.	Shows metastasis.		
Causes limited damage.	Causes serious damage.		
Its growth stops after reaching certain size.	It shows indefinite growth.		
It is less fatal to the body.	It is more fatal to the body.		

[CBSE Marking Scheme, 2011] 2

Commonly Made Error

• Many students write *non-cancerous* for benign tumour and *cancerous* for malignant tumour. Many of them write opposite statements.

Answering Tip

- Teach students the differences point wise and in a tabular form along with examples for better understanding and retention.
- Q. 29. Mention one application for each of the following :
 - (i) Passive immunization
 - (ii) Anti-histamine
 - (iii) Colostrum
 - (iv) Cytokine-barrier

R [Outside Delhi - 2017, Set-I]

- Ans. (i) Provide preformed antibodies/anti-toxins for quick response in case of infection by deadly microbes (tetanus) or snake bite. ½
 - (ii) Reduces symptoms of allergy. $\frac{1}{2}$
 - (iii) Provides passive immunity / antibodies / Ig A to new born. 1/2
 - (iv) Protection of non-infected cells from further viral infection. 1/2

[CBSE Marking Scheme, 2017]

- Q. 30. (i) Why is mother's milk considered very essential for the healthy growth of infants ?
 - (ii) What is the milk called that is produced in the initial days of lactation ?

[Outside Delhi Set-I & III, Comptt. 2016]

- **Ans. (i)** The milk secretion has nutrients and contain antibodies Ig A, immunoglobulin A or Ig A provide passive immunity.
 - (ii) Colostrum. 1 + 1

[CBSE Marking Scheme, 2016]

Short Answer Type Questions-II

- **All** Q. 1. On a visit to a Hill station, one of your friends suddenly became unwell and felt uneasy.
 - (i) List two symptoms you would look for to term it to be due to allergy.
 - (ii) Explain the response of the body to an allergy.
 - (iii) Name two drugs that can be recommended for immediate relief. [Foreign Set-I, 2016]
- Ans. (i) Sneezing, watery eyes, running nose, difficulty in breathing. (Any two) $\frac{1}{2} + \frac{1}{2}$
 - (ii) Body releases antibodies, lgE type and chemicals like histamine and serotonin from mast cells which produce symptoms of allergy. ½+½
 - (iii) Anti histamine, adrenalin, steroids.

(Any two) $\frac{1}{2} + \frac{1}{2}$

- [CBSE Marking Scheme, 2016]
- Q. 2. Certain attributes of innate immunity are given in the table below. Identify A, B, C, D, E and F respectively in it.

Sr. No.	Type of barrier	Example of the barrier	Function
(i)	А	В	Prevent microbial growth
(ii)	С	Polymorpho nuclear leucocytes	D
(iii)	Cytokine	Е	F

A [Delhi Set-I, Comptt., 2016]

- Ans. A. Physiological barrier. B. Acid in Stomach/Saliva in mouth/Tears.
 - b. Acid in Stomach/Sauva in m
 - C. Cellular Barrier.
 - D. Phagocytose/Destroy microbes.
 - E. Interferons.
 - F. Protect non-infected cells from virus attack.
 - $\frac{1}{2} + 6 = 3$
- Q. 3. State the three characteristics of Acquired Immunity. List the different ways by which it can be attained by humans.

U [Delhi Set-II, Comptt. 2016]

Ans. Characteristics of Acquired Immunity : Pathogen specific / characterized by memory / Acquired after birth / are of two types : Active and passive/humoral and cell mediated/includes primary response and secondary response.

(Any two) $1 \times 2 = 2$

Way by which it can be attained by humans: Active Immunity by encountering a pathogen / virulent microbe/suffering from contagious disease. ^{1/2} Passive Immunity through immunization /

readymade antibodies. ¹/₂ [CBSE Marking Scheme, 2016]

Detailed Answer :

Acquired immunity is pathogen specific. It is not present since birth. It develops during an individual's life time. It is characterized by memory of the first encounter with the pathogen, which helps in producing intensive secondary response when the pathogen attacks second time. It has the ability to distinguish different types of foreign molecules or antigens. It is of two types: (a) Active immunity which develops in the body when it is exposed to the antigens or the pathogens and (b) Passive immunity which is bestowed by antibodies directly given to the body.

Active immunity may be attained by the humans by introducing the pathogen either during immunization or by any infection, while passive immunity develops by readymade antibodies *e.g.* the antibodies received by foetus from mother. The cells which are responsible for producing acquired immune response are T-lymphocytes and B-lymphocytes. They produce antibodies which defend the body against the pathogens.

Answering Tip

- Give an outline classification of immunity on different bases for example (i) humoral and cell mediated (ii) active and passive and (iii) natural and acquired etc. Learn each term and process with example.
- Q. 4. Name a human disease, its causal organism, symptoms (any three) and vector, spread by intake of water and food contaminated by human faecal- matter.

U [Outside Delhi - 2017, Set - I, II, III]

Ans. Amoebiasis (Amoebic dysentery), *Entamaeba histolytica*, constipation, abdominal pain, cramps, stool with excess muscus, blood clots (Any three symptoms), Housefly.
 ¹/₂ × 6

OR

Ascariasis, *Ascaris*, internal bleeding, muscular pain, fever, anaemia, blockage of intestinal passage (Any three symptoms), Housefly. $\frac{1}{2} \times 6$

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Typhoid, *Salmonella typhi*, high fever, weakness, stomach pain, constipation, headache, loss of appetite (Any three symptoms), Housefly. $\frac{1}{2} \times 6$ [CBSE Marking Scheme, 2017]

OR



Q. 7. (i) It is generally observed that the children who had suffered from chicken-pox in their childhood may not contract the same disease in their adulthood. Explain giving reasons the basis of such immunity in an individual. Name this kind of immunity.
 (ii) What are interferons ? Mention their role.

OR

- Ans. (i) The first infection of chicken pox produce a primary response and antibodies are generated against chicken pox virus, subsequent encounter with the same virus elicits a highly intensified secondary response, due to the memory cells formed during the first encounter, active immunity. $\frac{1}{2} \times 4 = 2$
 - (ii) Proteins secreted by viral infected cells, which protects non infected cells from viral infection / when α interferon is given to cancer patient (it activates immune system), destroys tumour. $\frac{1}{2} \times 2 = 1$

[CBSE Marking Scheme, 2016]

(a) It is due to the memory of the immune system. When chickenpox virus first infects an individual a final first infects an individual a first the slaw and less effectives primary response against the pathogen. In the process B and T memory cells are formed by so when the pathogen comes again, the memory cells for the second of the pathogen and a highly intensified.

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	secondary conamiles fressponse is produced, which overel overwhelms the
	parhagen and to massive production of antibodies thus, once a pelson_
- 1 - 1 - 1	gets infected with chickenpox, it is highly unlikely that he will suffice
	from it again.
→	The memory generiated by natural infection is due to Natural Acquired
	Arthue Transingti
	Tester Thingson of
	(b) Interferons are a class of gly coproteins which are secreted by
	virus infected cells.
÷	They play a role in whating bappier of innate immunity and oralect
	unaltated really line hubbles will all interesting when proved
	unaffeirer de cours from furner viral inferren

Detailed Answer:

- (i) There are high chances that the people who have suffered from chickenpox in their childhood may not contract the disease again. This is due to acquired immunity which is characterised by memory. Acquired immunity is pathogen specific. When a pathogen for the first time infects a person it produces primary immune response which is of low intensity. When the same pathogen attacks again, highly intensified secondary (anamnestic) response is generated, thereby preventing the occurrence of disease.
- (ii) Interferons are glyco-proteinaceous substances secreted by virus-infected dead animal cells. These interferons protect the non-infected cells from getting infected by inhibiting viral replication.
- Q. 8. Medically it is advised to all young mothers that breastfeeding is the best for their newborn babies. Do you agree? Give reasons in support of your answer.

C [Outside Delhi/ Delhi, 2018] OR

Why is breast feeding recommended during the initial period of an infant's growth ? Give reasons. [Delhi Set-I, 2016]

Ans. Yes 1 Provides nutrition (calcium, fats, lactose) / provides (passive) immunity/ provides antibodies / Ig A. (Any two) = 1 + 1 [CBSE Marking Scheme, 2018]

Detailed Answer :

Breast-feeding is recommended during the initial period of an infant's growth as :

- (i) It provides passive immunity to the baby through colostrum.
- (ii) It provides a balanced nutrition to the baby.
- (iii) Also, it protects baby from allergens. 1×3

Answering Tip

- Always write the answer pointwise and each point must reflect a separate idea. Do not repeat the same point in different words.
- Q. 9. How does the HIV breakdown the immune system of the AIDS patients ?

U [Delhi Set-I, Comptt. 2015]

- Ans. (i) Virus enters in macrophages,
 - (ii) RNA genome replicates to form viral DNA with help of reverse transcriptase,
 - (iii) Viral DNA gets incorporated into host cells DNA to produce virus particles,
 - (iv) HIV enters into helper 'T' lymphocytes and produces progeny virus,
 - (v) Which are released in the blood and attack other helper 'T' lymphocytes,
 - (vi) This leads to progressive decrease in number of helper 'T' lymphocytes and the person starts suffering from infections (loss of immunity).

[CBSE Marking Scheme, 2015] ¹/₂×6=3

Q. 10. A farmer while working or his farm was bitten by a poisonous snake. The workers in the farm immediately rushed him to the nearby health centre. The doctor right away gave him an injection to save his life. What did the doctor inject and why? Explain.

U [Foreign 2017, Set - II, III]

- Ans. (i) Antitoxin / Antivenoms / Preformed antibodies. 1
 - (ii) Whenever quick immune response is required we need to directly inject preformed antibodies / Antitoxins. $\frac{1}{2} + \frac{1}{2}$
 - (iii) To neutralize snake venom quickly passive immunity is provided. 1/2 + 1/2 [CBSE Marking Scheme, 2017]

Q. 11 (i) What is an "allergic reaction"?

(ii) Name any two drugs used to quickly reduce the symptoms of allergy.

(iii) Why do more and more children in metro cities of India suffer from allergies and asthma?

[Outside Delhi Comptt. 2017, Set - I]

Ans. (i) The exaggerated response of the immune system to certain antigens present in the environment is called allergic reaction. 1

(ii) Anti-histamine, adrenalin, steroids. (Any two) ½ + ½

(iii) Due to deteriorating air quality, sensitivity to the environment, allergens, lowering of immunity due to modern day life style (which could be due to the protected environment provided largely in life). $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme 2017]

Q. 12. Your classmate complains of headache and cough. On the basis of certain symptoms, the doctor confirms that he is suffering from Pneumonia and not common cold. List these symptoms. Mention any two precautions to be followed to prevent the spread of this disease.

A [SQP, 2017-18]

- Ans. Doctor confirms pneumonia on the basis of the following symptoms fever, chills, grey blue lips and finger nails (Any two) ½ + ½ and not common cold, as the following symptoms are not observed Nasal congestion, sore throat hoarseness (Any two) ½ + ½.
 Precautions :
 - (i) Cover the nose when near the patient
 - (ii) Do not share glasses and utensils, articles used by the infected person 1/2 + 1/2 [CBSE Marking Scheme, 2017]
- Q. 13. Write the causative agent of filariasis in human. Mention its mode of transmission and symptoms of the disease.

R [Delhi Comptt. 2017, Set – II]

Ans.Wuchereria bancroft1Transmitted to a healthy person through the bite
of female mosquito vector.1Inflammation of lymphatic vessels of the
lower limbs or genital organs, leading to gross
deformities. $\frac{1}{2} + \frac{1}{2}$ [CBSE Marking Scheme, 2017]

Answering Tip

- Stress upon the importance of writing scientific names correctly according to Binomial Nomenclature. Mode of transmission, symptoms of all diseases should also be discussed.
- Q. 14. (i) What is the functional difference between B cells and T cells ?
 - (ii) Name the source used to produce hepatitis B vaccine using r-DNA technology.

R [Delhi Set-II, 2015]

Ans. (i) T cell arise from thymus and bone marrow, form cell mediated immune system. They

recognise the pathogen and trigger the B cells, B cells produce the antigen specific antibodies called Immunoglobulins.

- (ii) Hepatitis-B vaccine is produced by transgenic yeast using recombinant DNA technology.
 [CBSE Marking Scheme, 2015] 2+1=3
- Q. 15. (i) State what happens in the human body when malarial parasites infected RBCs burst to release the parasites in the blood.
 - (ii) Mention the specific sites in the host body where production of :
 - (a) Sporozoites and
 - (b) Gametocytes take place in the life cycle of the malarial parasites.

R [Delhi Set-III, Comptt. 2015]

- Ans. (i) The rupture of RBCs results in releasing toxic substance hemozoin, which is responsible for chill and high fever (recurring every 3-4 days).
 (ii) (a) Intestine of mosquito.
 - (b) RBCs of human. 1+1+1=3 [CBSE Marking Scheme, 2015]

Detailed Answer:

 When malarial parasite RBC burst they release a toxin called haemozoin. This causes chill and high fever which reoccur every third or fourth day.

- (ii) (a) Production of sporozoites takes place in the oocyst on the surface of intestine of the female *Anopheles* mosquito.
 - (b) Production of gametocyte occurs in the RBCs of human host.
- Q. 16. Show with the help of a flow chart only, the life cycle of malarial parasite in humans.

[Delhi - 2017, Set - III]

OR

Name the form of *Plasmodium* that gains entry into the human body. Explain the different stages of its life-cycle in the human body. [Delhi Set-I, II, III, 2014]

OR

Trace the life-cycle of malarial parasite in the human body when bitten by an infected female *Anopheles*.

[Outside Delhi Set-II 2012; Delhi Comptt. 2015] OR

Name the stage of *Plasmodium* that is transmitted to human body by the vector. Describe the life cycle of the parasite in humans. [Outside Delhi Set-I, Comptt. 2013; Outside Delhi Set-I, 2015]

OR

Trace the life cycle of *Plasmodium* in humans from the stage of entry until it is picked up by the female *Anopheles*.

[Delhi Set-I, II, III, 2010]

Ans. When mosquito bites, sporozoites are injected into blood stream \rightarrow parasite reaches the liver cells and multiplies \rightarrow liver cells burst releasing parasite into the blood \rightarrow parasites then enter into RBCs multiplying and bursting them \rightarrow male gametocytes, female gametocyte develop in RBCs $\frac{1}{2} \times 6 = 3$



Detailed Answer:

The parasite that causes malignant malaria in humans is *Plasmodium alciparum*. The sporozoites of *Plasmodium* enter the human body, when a female *Anopheles* mosquito bites a healthy person.

Life cycle of *Plasmodium* in human :

- (i) When the mosquito bites a man, sporozoites present in the salivary glands of female *Anopheles* mosquito are injected into the blood of the man.
- (ii) From the human blood, sporozoites enter the liver cells and grow in size to become a rounded schizont called cryptozoite. The latter divides to form crypto-merozoites.
- (iii) The crypto-merozoite enters the human RBCs and meta-cryptozoites are formed. The meta-cryptozoites divide to form metacryptomerozoites.
- (iv) In RBC, meta-cryptomerozoite becomes a rounded disc-like young trophozoite, which undergoes mitotic division to form multinucleate organisms, which give rise to merozoites.
- (v) Some erythrocytic merozoites enter fresh RBCs and form rounded gametocytes. When female *Anopheles* mosquito sucks the blood of

human, gametocytes enter the stomach of the mosquito. 1 + 2

- Q. 17. (i) Differentiate between benign and malignant tumours.
 - (ii) Why is colostrum a boon to the new born baby?

U [Outside Delhi Set-I, Comptt. 2015]

Ans. (i) Benign tumour remains confined to original location / does not spread to other part of the body / not cancerous.

Malignant tumour is mass of proliferating (neoplastic) cells that invade and damage surrounding tissue / cancerous tumour / tumour showing property of metastasis.

(ii) Colostrum contains antibodies / that provides resistance (immunity) to new born babies.

[CBSE Marking Scheme, 2015] 2+1=3

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Q. 18. Mention any two human diseases caused by
roundworms. Name their causative agents and
their mode of transmission into human body.
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Ans. Ascariasis — Ascaris 1¹/₂ Contaminated water/vegetables/fruits. Elephantiasis — Filariasis (*Wuchereria bancrofti*) 1¹/₂

Bite by female mosquito vectors.

[CBSE Marking Scheme, 2015]

Detailed Answer:

- Two human diseases caused by round worms are :
- (i) Ascariasis : Caused by *Ascaris lumbricoides*. It spreads through contaminated water fruits and vegetables.
- (ii) Filariasis : Caused by *Wuchereria bancrofti and W. malayi*. It is transmitted by the bite of female *Culex* mosquitoes.
- Q. 19. (i) Name and explain giving reasons the type of immunity provided to the new born by colostrum and vaccinations.
 - (ii) Name the type of antibody
 - (a) Present in colostrum
 - (b) Produced in response to allergens in human body [Delhi Set-II, III, 2014]
- Ans. (i) Passive immunity, when ready made antibodies are directly given to protect the body against foreign agents.
 Active immunity, when a host is exposed to antigens which may be in form of living or dead microbes or other proteins. Antibodies are produced in the host body. 2
 (ii) (a) IgA 1/2 + 1/2
 (b) IgE

[CBSE Marking Scheme, 2014]

Q. 20. Name the cells HIV attacks first when it gains entry into a human body. How does this virus replicate further to cause immunodeficiency in the body ? [Delhi Set-I, Comptt. 2013] OR Trace the events that occur in human body to cause immunodeficiency when HIV gains entry into the body. [Delhi Set-I, II, III, 2011, 2010]

Ans. HIV attacks macrophages first when it gains entry into a human body.

The events that occur in human body to cause immunodeficiency when HIV gains entry into the body are following :

- (i) The virus after getting into the body of a person enters the macrophages.
- (ii) The RNA replicates and DNA is formed by reverse transcription. The viral DNA gets incorporated into the host cell's DNA and directs the infected cell to produce virus particles.
- (iii) The macrophages continue to produce virus particles.
- (iv) The virus then enters the helper T-lymphocytes (TH), replicates and forms progeny viruses. which are released in the blood which attack other helper T-cells. This results in the progressive decline in the number of T-lymphocytes.
- (v) This fall in number of T-cell causes immunodeficiency in the body of the person infected with HIV. The person becomes easily infected by bacteria like Mycobacterium, viruses and even parasites like Toxoplasma.
- (vi) The person is unable to protect himself/herself against any infection.

Answering Tip

- All parts and sub parts of a question should be attempted together in the same sequence.
- **AI** Q. 21. (i) What makes some viruses cause cancer in humans ?
 - (ii) How do benign tumours turn malignant ? How do the latter harm the human body ?

U [Outside Delhi Set-I, Comptt. 2013]

- Ans. (i) Cancer-causing viruses are called oncogenic viruses or oncoviruses. They have genes called viral oncogenes. The normal protooncogenes present in normal cells get activated into oncogenes by some viruses and lead to oncogenic transformation of normal cells into cancerous cells causing cancer.
 - (ii) A benign tumour may turn malignant if it is not removed as soon as it is noticed. The benign tumour cells are sometimes carried by blood or lymph to other parts of the body where they spread, continue to divide and start new tumour there. Such tumour cells are called as malignant cells and the tumour as malignant tumour. The malignant tumours are called as cancer. A malignant tumour is not self-limited in its growth, is capable of invading into adjacent tissues and may be capable of spreading to distant tissues. A

benign tumour has none of these properties. The malignant tumours cells compete with the normal cells for vital nutrients and disrupt their normal metabolism and damage the normal cells. $1\frac{1}{2} + 1\frac{1}{2} = 3$

- Q. 22. (i) Write the symptoms of malaria in humans.
 - (ii) Name the stage of *Plasmodium* that enters into the vector. Describe the life cycle of the parasite in the vector. [R] [Outside Delhi Set-II, Comptt. 2013]
- Ans. (i) Symptoms : (a) High fever with chills and flulike illness.

(b) Headache, fatigue, sweating, nausea and vomiting.

(ii) *Plasmodium* enters the vector at the merozoite stage.

When the female *Anopheles* bites and sucks the blood of an infected human host, it receives RBCs containing the parasite at different stages of the erythrocytic cycle.

Gametegony: In the mosquito stomach, male gametes divide to form microgametes. Female gametes mature and are called macrogametes. The fertilization takes place and the zygote is

formed. The zygote embeds in the mosquito's stomach lining and multiplies to produce sporozoites, which are released and migrate to the salivary gland. When the mosquito bites a healthy human, sporozoites present in the salivary gland of the mosquito are injected into the blood of the man. 1 + 2 = 3

- Q. 23. (i) Write the scientific names of the two species of filarial worms causing filariasis.
- (ii) How do they affect the body of infected person (s)?(iii) How does the disease spread ?

R [Delhi Set-I, 2011]

- Ans. (i) Wuchereria bancrofti, Wuchereria malayi.
 - (ii) Inflammation of the lymphatic vessels of the lower limbs / inflammation of the genital organs / gross deformity of the lower limbs / deformity of the genital organs. (Any two)
 - (iii) Through the bite of female (*Culex*) mosquito. [CBSE Marking Scheme, 2011] 3
- Q. 24. (i) Name the stage of *Plasmodium* that gains entry into the human body.
 - (ii) Trace the stages of *Plasmodium* in the body of female *Anopheles* after its entry.
 - (iii) Explain the causes of periodic recurrence of chill and high fever during malarial attack in humans. U [Delhi Set-I, II, III, 2011]
- **Ans. (i)** The sporozoites enter in human blood due to biting of female *Anopheles* mosquito.
 - (ii) When the female *Anopheles* sucks the blood of an infected human host, it receives RBCs containing different stages of the erythrocytic cycle. In mosquito stomach, male gametes divide to form microgametes. Female gametes mature and are called macrogametes. The fertilization takes place and forms zygote.

- (iii) The parasite multiplies within the RBCs and ruptures the cells. Symptoms include headache, chill, shivering, nausea, muscular pain and recurring fever every 3rd and 4th day. The patient displays symptoms of malaria fever after a period of 14 days from infection. This time of interval is known as the incubation period, in which the parasite multiplies to increase its number so that it can produce enough toxins, which cause the periodic recurrence of chill and high fever during malaria. 1 + 1 + 1
- Q. 25. (i) Name the causative agent of typhoid in humans.
 - (ii) Name the test administered to confirm the disease.
 - (iii) How does the pathogen gain entry into the human body? Write the diagnostic symptoms and mention the body organ that gets affected in severe cases.

R [Outside Delhi Set-I, II, III, 2011]

- **Ans. (i)** *Salmonella typhi* is a pathogenic bacterium that causes typhoid fever in human beings.
 - (ii) Typhoid fever could be confirmed by Widal test.
 - (iii) The pathogens generally enter the small intestine through food and water contaminated with them and migrate to other organs through blood.

Symptoms : Sustained high fever (39°– 40°C), weakness, stomach pain, constipation, headache and loss of appetite are some of the common symptoms of this disease. Intestinal perforation and death may occur in severe cases.

canal

3 = 3

Q. 26. Study the diagram showing replication of HIV in humans and answer the following questions

Mai

and



- (i) Write the chemical nature of the coat 'A'.
- (ii) Name the enzyme 'B' acting on 'X' to produce molecule 'C'. Name 'C'.

- (iii) Mention the name of the host cell 'D' the HIV attacks first when it enters into the human body.
- (iv) Name the two different cells the new viruses 'E' subsequently attack.

R [Outside Delhi Set-I, II, III, 2011]

- Ans. (i) The chemical nature of the coat : Viral protein coat.
 - (ii) Enzyme B Viral DNA is produced by the enzyme reverse transcriptase. (Process called reverse transcription.)
 - X Viral RNA is introduced into Cell.
 - C = Viral DNA.
 - (iii) Host cell (D) = Macrophage.
 - (iv) Two different cells are macrophages and helper T-lymphocytes.

 $\frac{1}{2} + \frac{1}{2} + 1 + \frac{1}{2} + \frac{1}{2} = 3$ [CBSE Marking Scheme, 2011]

Q. 27. Name the type of immunity that is present at the time of birth in humans. Explain any two ways by which it is accomplished.

Ans. The type of immunity that is present at the time of

birth in humans is innate immunity. The two ways by it can be accomplished are :(i) Certain types of leucocytes (WBCs) like

- (1) Certain types of leucocytes (WBCs) like neutrophils, monocytes and natural killer (lymphocytes) in the blood and marcophages in tissues can engulf microbes, viruses and cellular debris etc.
- (ii) Mucus secreted by mucous membrane traps the microorganisms and immobilize them. The skin is the physical barrier of the body. Its outer tough layer prevents the entry of bacteria and viruses. 1 + 1 + 1 = 3
- Q. 28. (i) What precaution (s) would you recommend to a patient requiring repeated blood transfusion ?
 - (ii) If the advise is not followed by the patient, there is an apprehension that the patient might contract a disease that would destroy the immune system of his/her body. Explain with the help of schematic diagram only how the immune system would get affected and destroyed.

C [Delhi - 2017, Set - I]

- Ans. (i) Ensuring blood (from blood banks) is safe from HIV / screening blood for HIV / AIDS / Hepatitis / ensuring use of only disposable needles and syringes in (public and private) hospitals / clinic 1
 - (ii) For Diagram: Refer Topic 1 / Revision Notes / Important Diagrams / Fig 8.3

[CBSE Marking Scheme, 2017]

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Commonly Made Error

- Students fail to draw a neat diagram. Make sure the lines are properly marked. Lines which are not properly marked will deduct your marks. Graphic representations should be in the proper sequence.
- Q 29. Name the causative organism of the disease amoebiasis. List three symptoms of the disease.

R [Delhi Set-I, 2016]

- Ans. Amoebiasis is caused by *Entamoeba histolytica*. **The symptoms of the disease include :**(i) Stools with mucus and blood.
 (ii) Diarrhoea, pain and stomach cramps.
 (iii) Constipation.
 1 + 1 = 2
 - [CBSE Marking Scheme, 2016]
- Q. 30. (i) Name the causative agent of amoebiasis and mention its symptoms.
 - (ii) Write how does it spread.

R [Delhi Comptt. 2017, Set - I]

- Ans. (i) Entamoeba histolytica 1 Symptoms - Constipation, abdominal pain, cramps, stool with excess mucus and blood clot. (Any two) $\frac{1}{2} + \frac{1}{2}$
 - (ii) Spreads though housefly, drinking water contaminated with faecal matter, eating food contaminated with faecal matter

(Any one) 1 [CBSE Marking Scheme, 2017]

- **AI** Q 31. A heavily bleeding and bruised road accident victim was brought to a nursing home. The doctor immediately gave him an injection to protect him against a deadly disease.
 - (i) Write what the doctor injected into the patient's body.
 - (ii) How do you think this injection would protect the patient against the disease ?
 - (iii) Name the disease against which this injection was given and the kind of immunity it provides.

C [Outside Delhi Set-I, 2015]

Ans. (i) Tetanus antitoxins/Tetanus toxoid. 1 (ii) The preformed antibody injected, act on the pathogen immediately to provide protection. $\frac{1}{2} \times 2 = 1$

Long Answer Type Questions

- Q. 1. (i) How does a Human Immunodeficiency Virus (HIV) replicate in a host ?
- (ii) How does an HIV-infected patient lose immunity?

(iii) Tetanus, passive acquired immunity.

 $\frac{1}{2} \times 2 = 1$ [CBSE Marking Scheme, 2015]

Detailed Answer:

- (i) In the patient's body, the doctor has injected antiserum containing preformed antibodies against the causative organisms or toxin produced by it.
- (ii) The solution injected by the doctor had antibodies. Hence, the injection would protect the patient against the diseases and provide him humoral immunity.
- (iii) The disease against which this injection was given is tetanus caused by *Clostridium tetani,* which usually exists in environment as spores and may gain access to the body through wound.

The type of immunity that the injection containing antiserum provides is a passive acquired immunity as preformed antibodies are used because fast action is required in this emergency case. $1 \times 3 = 3$

- Q. 32. Why does a doctor administer tetanus antitoxoid and not a tetanus vaccine to a child injured into a road side accident with bleeding wound? Explain. A [Outside Delhi, 2010]
- Ans. Tetanus antitoxoid i.e. preformed antibodies are injected so as to obtain quick immunization response against infection by microbes. Tetanus vaccine, if injected will take time to develop antibodies in the body so that immunization response would be delayed and this may lead to the fatal end.
- Q. 33. A young boy when brought a pet dog home started to complain of watery eyes and running nose. The symptoms disappeared when the boy was kept away from the pet.
 - (i) Name the type of antibody and chemicals responsible for such a response in the boy.
 - (ii) Mention the name of any one drug that could be given to the boy for immediate relief from such a response.
- Ans. (i) Antibody: lgE. Chemicals : Histamine & serotonin. The antibody (lgE) cause the release of these chemicals from mast cells.
 - (ii) **Drugs** : Antihistamine (citrazen, Avil-25/50), Adrenalin and steroids, quickly reduce such symptoms of allergy.

 $1\frac{1}{2} + 1\frac{1}{2}$

(5 marks each)

(iii) List any two symptoms of this disease.

A [Foreign Set-I, 2016]

- Ans. (i) Diagram: Refer Topic 1 / Revision Notes / Important Diagrams / Fig 8.3 $\frac{1}{2} \times 6 = 3$ 1
 - (ii) Loss of T-lymphocytes
 - (iii) Fever / diarrhea / susceptibility to other diseases, prone to microbial infection.

(Any two) $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2016]

Detailed Answer:

- (i) The HIV replicates in the host by a process of reverse transcription, In this process the viral RNA replicates to form viral DNA with the help of the enzyme reverse transcriptase. This viral DNA then gets incorporated into the host cell's DNA which directs the infected cell to produce virus particles.
- (ii) The HIV infected patients loose immunity because of loss of T-lymphocytes. The HIV enter into helper T-lymphocytes and produce progeny viruses which are released into the blood and attack other helper T-lymphocytes. This leads to the progressive decrease in number of T-lymphocytes which results in the loss of immunity as a result of which the patient in unable to protect himself from any type of infection.
- (iii) The common symptoms of HIV patients are fever, diarrhoea, susceptibility to other diseases and infections.
- Q. 2. Explain the process of replication of a retrovirus after it gains entry into the human body.

U [Delhi Set-III, 2014]

Ans. After getting into the body of the person, the virus enters into macrophages, where RNA genome of the virus replicates to form viral DNA with the help of the enzyme reverse transcriptase. This viral DNA gets incorporated into host cell's DNA and directs the infected cells to produce virus particles. The macrophages continue to produce virus particles and acts like a HIV factory. Simultaneously, HIV enters into helper T-lymphocytes (T_{H}) , replicates and produce progeny viruses. The progeny viruses released in the blood attack other helper T-lymphocytes.

> This is repeated leading to a progressive decrease in the number of helper T-lymphocytes in the body of the infected person. During this period, the person suffers from bouts of fever, diarrhea and weight loss. Due to decrease in the number of helper T-lymphocytes, the person starts suffering from infections that could have been otherwise overcome, such as those due to bacteria especially Mycobacterium, viruses, fungi and even parasites like Toxoplasma. The patient becomes so immunodeficient that he / she is unable to protect himself / herself against infections.

[CBSE Marking Scheme, 2014] 5

- Q. 3. (i) Name the type of lymphoid organs-lymph nodes and thymus are. Explain the role played by them in causing immune response.
 - (ii) Differentiate between innate immunity and acquired immunity. **U** [Foreign 2017, Set - I, II]

Ans. (i) Thymus: Primary lymphoid organ, immature lymphocytes differentiate here into antigensensitive lymphocytes. $\frac{1}{2} \times 3 = \frac{1}{2}$ Lymph node : Secondary lymphoid organ. Provide the site for interaction of lymphocytes with antigen, which proliferate to become effector cell. $\frac{1}{2} \times 3 = 1\frac{1}{2}$

(11)	
Innate Immunity	Acquired Immunity
Non-specific type of response.	Pathogen specific defense.
Present at the time of birth.	Acquired by the body after birth.
Provides barrier to the entry of foreign agents into our body.	Characterised by memory.
Four types (physical barriers, physiological barriers, cellular barriers, cytokine parriers).	Two types-primary & secondary.
() 11	two differences) $1 \pm 1 = 2$

[CBSE Marking Scheme, 2017]

- Q.4. (i) Cancer is one of the most dreaded diseases of humans. Explain 'Contact inhibition' and 'Metastasis' with respect to the disease.
 - (ii) Name the groups of genes which have been identified in normal cells that could lead to cancer and how they do so ?
- (iii) Name any two techniques which are useful to detect cancers of internal organs.
- (iv) Why are cancer patients often given α -interferon as part of the treatment?

R [Outside Delhi & Delhi Set-II, 2014]

- Ans. (i) Contact with other cells inhibits their uncontrolled growth. Tumour cells reach distant sites, through blood. $\frac{1}{2} + \frac{1}{2}$
 - (ii) Proto oncogenes. 1/2 When activated under certain condition could lead to oncogenic transformation of the cells. 1/2
 - (iii) Biopsy / radiography / CT / MRI (Any two) $\frac{1}{2} + \frac{1}{2}$
 - (iv) It activates immune system, destroys tumour. $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2014]

Detailed Answer:

(i) Contact inhibition : Normal cells have the property of contact inhibition *i.e.* their growth is stopped after coming in contact with other cells. But the cancer cells do not have this property of contact inhibition. They unlike normal cells divide continuously (uncontrolled cell division) and give rise to a mass of cells called tumour.

Metastasis : It is the property exhibited by the cancerous cells. In this process, the cancerous

cells spread to different parts of the body. Same cells get sloughed off from the tumour and move to distant sites through body fluids and initiate the formation of new tumours by dividing actively.

- (ii) Many genes called as proto oncogenes or cellular oncogenes have been identified in normal cells which when activated under certain conditions lead to the oncogenic transformation of normal cells causing cancer.
- (iii) X Rays (Radiography), CT (computerized tomography), MRI and biopsy are useful in detecting cancers of internal organs.
- (iv) The cancer patients are often given α-interferons as a part of treatment because it activates their immune system and helps in destroying tumour.
- **All** Q. 5. (i) Name and explain any four lymphoid organs present in humans.
 - (ii) Categorise the named lymphoid organs as primary or secondary lymphoid, giving reasons.

R [Foreign Set-II, 2014, NCERT]

- Ans. (i) (a) Bone marrow blood cells-lymphocytes are produced and mature.
 - (b) Thymus : Large at the time of birth but keep reducing in size with age. T-Lymphocytes are produced and mature.

- (c) Spleen : Acts as a filter for micro-organisms in blood and reservoir for RBCs. In foetus, it produces all types of blood cells but in adults it produces only lymphocytes. Macrophages of spleen are phagocytic.
- (d) Lymph nodes : Act as filters for lymph, trap micro-organisms or other antigens and activate lymphocytes and initiate immune system.
- (ii) **Primary lymphoid organs** bone marrow and thymus.

Immature lymphocytes differentiate into antigen sensitive lymphocytes.

Secondary lymphoid organ : spleen and lymph nodes.

Provide the site for interaction of lymphocytes with antigen, which proliferate to become effector cell.

[CBSE Marking Scheme, 2014] 5

Answering Tip

• Learn the concept of lymphoid organs carefully. Learn differences between primary and secondary lymphoid organ with proper examples.

TOPIC-2 Drugs and Adolescence

Revision Notes

- > Drugs
 - These have the ability to alter the activity of nervous system.
 - They are also called as psychotropic drugs or mood altering drugs or neurological drugs.
 - These drugs change the mood, feeling behaviour and power of perception.
 - The sources of most of the drugs are mainly flowering plants and some fungi.
- Types of Drugs
 - The drugs, which are commonly abused are opioids, cannabinoids and coca alkaloids.
 - These drugs are of following main types :
 - 1. Depressants
 - Depress brain activity.
 - They include

(a) Sedatives : Give calmness and relaxation. High doses induce sleep. *e.g. Barbiturates* (sleeping pills).
(b) Tranquilizers : Lower tension and anxiety without inducing sleep. *e.g. Benzodiazepines* (*e.g. Valium*).

- 2. Opiate Narcotics (Pain Killers)
 - Drugs which bind to specific opioid receptors in CNS and gastrointestinal tract.
 - They are analgesic and depressant (lower tension, anxiety, B.P and respiration rate and reduce visual activity) *e.g.* Opium and its derivatives (Opiates or Opioids).
- Opium is obtained from dried latex of unripe capsules of Poppy plant (Papaver somniferum).
- > Opium Derivatives
 - (a) Morphine: Strong analgesic and sedative extracted from the latex of poppy plant. Useful during surgery.
 - (b) Brown sugar
 - (c) *Heroin* (Diacetyl morphine/*smack*) : Most dangerous, white, odourless, bitter crystalline compound produced by acetylation of morphine. It is a depressant and slows down body functions. It is taken by snorting and injection.
 - (d) *Codeine* : Mild analgesic. Used in cough syrups.

3. Stimulants

- Stimulates CNS e.g. Cocaine, Caffeine (cardiac stimulant), amphetamines (synthetic).
- Amphetamines & anabolic steroids are misused by some athletes.
- Coca alkaloid (Cocaine or coke / crack) : Obtained from coca plant (Erythroxylum coca).
- Interferes the transport of neurotransmitter dopamine.
- Cocaine is usually snorted.
- Stimulate CNS producing euphoria and energy.
- Excessive dosage causes hallucination.

4. Hallucinogens

- Cause hallucinations, changing thoughts, feelings and perceptions *e.g. Mescaline, Psilocybin, Cannabinoids* & LSD (Lysergic Acid diethylamide).
- Atropa belladonna & Datura are plants with hallucinogenic property.

5. Cannabinoids

- Drugs (a group of chemicals) that interact with cannabinoid receptors in brain.
- Generally taken by inhalation and oral ingestion.
- Natural cannabinoids are obtained from *Cannabis sativa* (Hemp plant). It's flower tops, leaves & resin are used to produce *bhang, ganja, charas (hashish), marijuana* etc.
- Affects cardiovascular system.

Alcoholism

- Alcohols include beverages and spirits.
 (a) Beverages : Wine, beer and toddy (5-15% alcohol).
- (b) Spirits : Whisky, brandy, rum, gin, arrack, etc (more than 50% alcoho
- The victims of alcoholism are known as alcoholics.

Effects of Alcoholism

- (a) Affects thinking ability, speech, movements, reflexes, etc.
- (b) Amnesia, blurred vision, loss of body balance, nausea, vomiting, headache, etc.
- (c) Cirrhosis and fatty liver.
- (d) Alcoholic polyneuritis and loss of appetite.
- (e) Cardiovascular diseases and hypertension
- (f) Ulcer, pancreatitis and gastritis.
- (g) Loss of sexual drive and necrospermia.)
- (h) Foetal alcohol syndrome (FAS or Alcohol Embryopathy).
- (i) Family and social problems

> Effects of Alcoholism on Traffic Accidents

- (a) Affects co-ordination and correct judgment of distance.
- (b) Affects vision causing Tunnel vision.
- (c) Increases reaction time.
- (d) Affects behaviour.

De-alcoholism

- Medical treatment.
- Social methods of treatment (Group therapy).
- Aversion therapy (Behavioural treatment).

Smoking

- Tobacco is smoked, chewed or used as a snuff.
- Tobacco contains nicotine (an alkaloid) which stimulates adrenal gland to release adrenaline and noradrenaline causing high BP and heart rate.
- Smoking causes cancers of lung, urinary bladder and throat, bronchitis, emphysema, coronary heart disease, gastric ulcer etc. Tobacco chewing causes oral cancer.
- Smoking increases CO (Carbon monoxide) content in blood and reduces oxyhaemoglobin. This causes O₂ deficiency in the body.
- Adolescence
 - It is 'a period' and 'a process' during which a child becomes mature in terms of his / her attitudes and beliefs for effective participation in society.
 - Adolescence is a bridge linking childhood and adulthood (period of 12-18 years of age). It is very vulnerable phase of mental and psychological development.
 - Causes of Drug or Alcohol use in Adolescence Period
 - (a) Curiosity and Experimentation.
 - (b) Need for adventure and excitement.

- (c) To escape facing problems.
- (d) Stress from pressure to excel in academics or examination.
- (e) Television, movies, news papers, internet etc.
- (f) Unstable or unsupportive family structures and peer pressure.

Addiction

- It is a psychological attachment (euphoria and a temporary feeling of well being) with drugs and alcohol.
- With repeated use of drugs, the tolerance level of the receptors increases. Thus, the receptors respond only to
 higher doses leading to greater intake and addiction.

> Dependence

- It is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if regular dose of drugs / alcohol is abruptly discontinued.
- This results in anxiety, shakiness, nausea and sweating.
- Dependence leads to social adjustment problems.

Effects of Drug or Alcohol Abuse

- (a) Reckless behaviour, vandalism and violence.
- (b) Coma and death due to respiratory failure, heart failure or cerebral hemorrhage.
- (c) Drugs together with alcohol may cause death.
- (d) Drop in academic performance and absence from school.
- (e) Lack of interest in personal hygiene.
- (f) Withdrawal and isolation.
- (g) Depression, fatigue, aggressive and rebellious behaviour, deteriorating relationship between family and friends.
- (h) Loss of interest in hobbies.
- (i) Fluctuations in sleeping, eating habits, weight, appetite, etc.
- (j) Social problems like stealing and spread of infectious diseases (e.g. AIDS, hepatitis B).
- (k) Damage of nervous system and cirrhosis.
- (I) Use of drugs and alcohol by pregnant woman adversely affects the foetus.
- (m) Misuse of drugs by athletes (*e.g.* narcotic analgesics, anabolic steroids, diuretics and certain hormones to increase muscle strength and bulk and to promote aggressiveness).
- Side Effects of Anabolic Steroid in Females
 - (a) Masculinisation
 - (b) Mood swings and depression
 - (c) Excessive hair growth
 - (d) Deepening of voice
 - (e) Increased aggressivene
 - (f) Abnormal menstrual cycle

 - (g) Enlargement of clitoris
- Side Effects of Anabolic Steroid in Males
 - (a) Acne
 - (b) Mood swings and depression
 - (c) Increased aggressiveness
 - (d) Reduced testicles
 - (e) Decreased sperm
 - (f) Kidney and liver dysfunction
 - (g) Breast enlargement
 - (h) Premature baldness
 - (i) Enlargement of prostate gland
- Side Effects in the Adolescent, Male and Female
 - Severe facial and body acne.
 - Premature closure of the growth centres of the long bones resulting in stunted growth.

Prevention and Control

- (a) Avoid undue peer pressure.
- (b) Education and counselling.
- (c) Seeking help from parents and peers.
- (d) Looking for danger signs.
- (e) Seeking professional and medical help.
- (f) Psychologists and psychiatrists.
- (g) De-addiction and rehabilitation programs.

Yery Short Answer Type Questions

Q. 1. How are morphine & heroin related ? Mention their effects on human body.

U [Outside Delhi Set, Comptt., 2014]

- Ans. Both are obtained from a plant '*Papaver somniferum*'. Heroin is related to morphine as it is obtained by acetylation of the later. Morphine is a sedative while heroin is a depressant.
- Q. 2. How does smoking tobacco in human lead to oxygen deficiency in their body ? C [Delhi Set-I, 2012]
- **Ans.** Smoking increases the carbon monoxide (CO) content in the blood which has greater affinity to haemoglobin than oxygen. CO forms a stable bond with haemoglobin and does not allow binding of oxygen. It reduces concentration of haem bound oxygen and causes oxygen

Short Answer Type Questions

AI Q. 1. Why are adolescents especially advised not to smoke ? How does smoking affect the functioning of the body ?

A [Outside Delhi Set-I, Comptt., 2016]

Ans. Because smoking paves the way to hard drugs, increased chances of cancer particularly of lungs, cause oxygen deficiency in the body (any two); Nicotine (in cigarette) stimulates adrenal gland, which raises blood pressure / increases heart rate. It increases carbon monoxide (CO) in blood and reduces oxyhaemoglobin. This causes O_2 deficiency in the body. Therefore, the adolescents are advised not to smoke.

[CBSE Marking Scheme, 2016] 2

- Q. 2. Name two drugs obtained from poppy plant. "These drugs are medically useful but are often abused". Taking the mentioned examples justify by giving reasons. R [Outside Delhi Set-II, 2016]
- **Ans.** Heroin / smack, morphine; morphine obtained from latex of unripe capsules of poppy plant (*Papaver somniferum*) is an effective pain killer and sedative, heroin (a derivative of morphine) is used as drug. If these drugs are taken for the purpose

other than medicinal or taken in larger doses that may impair the physical and mental state of a person. Then it is said to be abused. 2

[CBSE Marking Scheme, 2016]

AI

Q. 3. What happens to an individual when a regular dose of drugs/alcohol is abruptly discontinued?

deficiency in the body. Smoking also damages alveolar walls, which reduces respiratory surface (emphysema). 1

[CBSE Marking Scheme, 2012]

Q. 3. Mention the useful as well as harmful drug obtained from latex of poppy plant. [R] [Foreign, 2011]

Ans. Morphine.

- Q. 4. Name one plant & the addictive drug extracted from its latex. How does this affect the human body ?
- Ans. Morphine & Heroin are the addictive drug obtained from a plant called *Papaver somniferum*. Morphine is used as sedative but harmful when used as opioids. Heroin is a depressant and slows down body functions

(2 marks each)

What characteristics, manifest in the individual under such a situation ?

A [Outside Delhi Set-III, Comptt., 2016]

Ans. Withdrawal syndrome. 1 Manifestation of unpleasant characteristics and feelings.

Anxiety, shakiness, nausea and sweating.

(Any two) ½+½=1

[CBSE Marking Scheme, 2016]

Q. 4. What is "withdrawal syndrome" ? List any two symptoms, it is characterized by.

R [Foreign Set-I, 2014]

Ans. Manifestation of unpleasant characteristic when a regular dose of drugs / alcohol is abruptly discontinued or reduced. 1

Unpleasant feeling, Anxiety, shakiness, nausea, sweating. [CBSE Marking Scheme, 2014] 1

- Q. 5. (a) Name the source plant of heroin drug. How is it obtained from the plant?
- (b) Write the effects of heroin on the human body. [Outside Delhi/ Delhi, 2018] OR

Name the plant source of the drug popularly called "smack". How does it affect the body of the abuser ? [Delhi Set-I, 2012]

OR

Name an opioid drug and its source plant. How does the drug affect the human body ?

[Outside Delhi Set-I, 2010]

(1 mark each)

- Ans. (a) Papaver somniferum / Poppy plant. $\frac{1}{2}$ Extracted from latex of the plant / acetylation of morphine (obtained from the latex of plant). $\frac{1}{2}$
 - (b) Depressant, slows down body function.

 $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2018]

Detailed Answer :

- (a) Heroin, commonly called smack (chemical name diacetylmorphine) is a white, odourless, bitter crystalline compound. This is obtained by acetylation of morphine, which is extracted from the latex of poppy plant (*Papaver somniferum*).
- (b) Opioid drugs bind to a specific opioid receptor present in our central nervous system and gastrointestinal tract. Heroin is a depressant and slows down body functions. 1+1

Answering Tip

• Learn the names of the drug and their source plant with correct biological names according to the rules of binomial nomenclature. Stress upon the effects of drug on human body.



Q. 6. Name the plant source of *ganja*. How does it affect the body of the abuser ?

R [Outside Delhi Set-II, 2012]

 Ans. Ganja is obtained from Cannabis sativa / hemp plant.
 1

 It is hallucinogenic, alters perception, causes

illusion and damages cardio vascular system. 1 [CBSE Marking Scheme, 2012]

Q. 7. Name and state the effect of a drug that is often medically prescribed, but its over use leads to drug dependence and drug abuse.

U [Delhi Comptt. 2017, Set - I, III]

Ans. Morphine, barbiturate, amphetamines, benzodiazepines, lysergic acid diethyl amides (LSD) 1

> Affects the central nervous system, acts as a pain killer, acts as a sedative, treats depression, treats insomnia, creates hallucinogenic effect.

> > (Any two) $\frac{1}{2} + \frac{1}{2}$

[CBSE Marking Scheme, 2017]

(3 marks each)

- Q. 1. (i) HIV and Hepatitis-B are STDs. Mention the two other ways by which they can be transmitted to a healthy person.
 - (ii) Why is early detection of STD essential ? What can it lead to otherwise ? Explain

U [Outside Delhi Set-III, Comptt. 2016]

- Ans. (i) HIV can also be transmitted to a healthy person by :
 - (a) Sharing of infected needles and surgical instruments.
 - (b) From infected mother to the foetus.
 - (c) Transfusion of infected Blood.

(Any two) $\frac{1}{2} + \frac{1}{2} = 1$

(ii) Leads to complication in life later; pelvic inflammatory disease (P/D) / abortion /

 $\begin{array}{ll} \text{infertility} \ / \ \text{cancer} \ \text{of reproductive tract, still} \\ \text{birth, ectopic pregnancies. STDs are curable if} \\ \text{detected early and treated properly otherwise} \\ \text{they may lead to death.} \\ \begin{array}{ll} 1+1=2 \end{array} \end{array}$

[CBSE Marking Scheme, 2016]

Q. 2. A doctor prescribed morphine as a sedative and pain killer to your cousin who had undergone surgery. Even after recovery, he craved for the prescribed medicine. What do you conclude about his condition, had he continued with the same medication? After appraising yourself, what measures will you suggest to him to overcome this problem? Briefly explain any two.

C [SQP, 2017-18]

Ans. Drug dependence is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome. If regular dose of drugs is abruptly discontinued / because of perceived benefits, drugs are frequently used repeatedly from which the person may not be able to rid off.

Measures :

- (i) Education and counselling-to face problems and stresses / to channelize the energy into healthy pursuits like reading, music, yoga and other extracurricular activities.
- (ii) Seeking help from parents-to guide the person appropriately and immediately.
- (iii) Seeking professional and medical help-to help the person to get rid of the problem completely with sufficient efforts and will power. [CBSE Marking Scheme, 2017] 3
- Q. 3. Prior to a sports events blood and urine samples of sports persons are collected for drug tests.
 - (i) Why is there a need to conduct such tests ?
 - (ii) Name the drugs the authorities usually look for.
- (iii) Write the generic names of two plants from which these drugs are obtained. A [Delhi Set-I, 2016]

- Ans. (i) To detect drug abuse / use of banned drugs / use of cannabinoids / anabolic steroids / narcotic analgesic diuretics / hormones / drugs used to accelerate performance / increase muscle strength / bulk / promote aggressiveness / to ensure fair game.
 - (ii) Cannabinoids / cocaine / coca alkaloid / coke / crack / hashish / charas / ganja / hemp plant extract.
 - (iii) Cannabis / Atropa / Erythroxylum / Datura.

(Any two) 1×3=3 [CBSE Marking Scheme, 2016]

Detailed Answer:

- The blood test is conducted to check the level of certain drugs in the blood which are banned by sports authorities.
- (ii) Authorities look for certain drugs like narcotic analgesics, anabolic steroids, diuretics and certain hormones.
- (iii) The generic name of the plants from which drugs are obtained are *Cannabis sativa* and *Papaver somniferum*.
- Q. 4. A group of youth were having a 'rave party' in an isolated area and was raided by police. Packets of 'smack' and syringes with needles were found littered around.
 - (i) Why is taking 'smack' considered an abuse ?
- (ii) Write the chemical name of 'smack' and the name of its source plant.
- (iii) Syringes and needles used by the youth for taking the drug could prove to be very fatal. Why?

E & A [Delhi-Set - II, 2017]

Ans. (i) Because an addictive substance causes drug dependence and affects nervous system/used in amounts or frequencies that impairs ones physical and physiological or psychological functions. 1

(ii) Diacetyl-morphine ¹/₂

Papaver somniferum / poppy plant / opium poppy. ½

(iii) They can acquire serious infections *i.e.* transmission of HIV infections or AIDS or Hepatitis.

[CBSE Marking Scheme, 2017]

- Q. 5. (i) Why is there a fear amongst the guardians that their adolescent wards may get trapped in drug/ alcohol abuse ?
- (ii) Explain 'addiction' and 'dependence' in respect of drug / alcohol abuse in youth.

U [Outside Dehli, Set - I, II, III, 2017]

Ans. (i) Adolescents are easily affected by (Vulnerable to) peer pressure, adventure, curiosity, excitement, experimentation and media.

 $(Any two) = \frac{1}{2} + \frac{1}{2}$

(ii) Addiction : Psychological attachment to certain effects such as Euphoria or temporary feeling of well - being. 1

Dependence : Tendency of the body to show withdrawal syndrome or symptoms if regular doses of drug or alcohol is abruptly discontinued. 1

[CBSE Marking Scheme 2017]

Answering Tip

• Practice writing all definitions emphasizing on operative terms.

AT Q. 6. Explain the following with reference to drug/ alcohol abuse : (i) Addiction, (ii) dependence and (iii) withdrawal symptoms.

U [Outside Delhi comptt. - 2017, Set - III]

Ans. (i) Addiction - Frequent use of drugs or alcohol leads to increase in the level of tolerance of receptors present in our body, thus making these receptors respond to only higher doses of drugs and alcohol. $\frac{1}{2} + \frac{1}{2}$

Psychological attachment to certain effects such as euphoria and temporary feeling of well being associated with drugs and alcohol.

- (ii) Dependence Due to inherent addictive nature and its psychological attachment to drugs or alcohol and are unable to live without them.
- (iii) Withdrawal syndrome When a person is taking drugs/alcohol regularly and the intake of drugs is abruptly discontinued it leads to various characteristics symptoms (nausea, anxiety, shakiness, sweating etc.).

[CBSE Marking Scheme, 2017]

Answering Tip

- Familiarize students with given technical terms like addiction, dependence, withdrawal syndrome. Emphasize on writing precise answer using correct keywords.
- Q. 7. A team of students are preparing to participate in the interschool sports meet. During a practice session you find some vials with labels of certain cannabinoids.
 - (i) Will you report to the authorities ? Why ?
 - (ii) Name a plant from which such chemicals are obtained.

(ii) Write the effect of these chemicals on human body. [E & A] [Delhi Set-I, 2015]

 Ans. (i) Yes
 ½

 May be abused by sports persons.
 ½

 (ii) Cannabis sativa / any other relevant plant.
 1

 (iii) Effects cardio vascular system of the body.
 [CBSE Marking Scheme, 2015] 1

Detailed Answer :

(i) Yes, I would report the matter to the authorities because vials might have been abused by the sports persons. Moreover, cannabinoids are classified under drugs and drug abuse is an illegal practice.

- Oswaal CBSE Chapterwise & Topicwise Question Bank, BIOLOGY, Class XII
- (ii) Cannabinoids can be obtained from a plant called *Cannabis sativa*.
- (iii) Although these chemicals increase athletic performance of the sports persons but they have many harmful side effects. The cannabinoids bind to cannabinoid receptors present in the brain and affect the cardiovascular system. 1+1+1
- Q. 8. 'Prevention is better than cure' is an apt slogan to safeguard adolescents from drug abuse. List any six steps that could be taken in this regard.

C [Outside Delhi Set-I, II, Comptt. 2013] Ans. Six steps that can be taken for prevention and

control of drug abuse among adolescents are :

- (i) A regular monitoring of the activities of adolescents by parents.
- (ii) Avoiding undue peer pressure as every child has his own stamina and personality.
- (iii) Educating and counselling about the dangers of drug abuse.
- (iv) Channelizing the child's energy into healthy pursuits like sports and other extra-curricular activities.
- (v) Seeking professional and medical help for those who have unfortunately got in the quagmire of drug.
- (vi) Identifying the motivations for alcohol and drug abuse in children. $\frac{1}{2} \times 6 = 3$
- Q. 9. Write the source and the effect on the huma body of the following drugs :
 - (i) Morphine
 - (ii) Cocaine (iii) Marijuana
- R Delhi Set-I, 2011
- Ans. (i) Morphine : poppy plant / Paparer somniferum, depressant. 1/2 + 1/2 = 1
 (ii) Cocaine : Erythroxylum coca, stimulates CNS /
 - causes euphoria / hallucination. $\frac{1}{2} + \frac{1}{2} = 1$ (iii) Marijuana : Cannabis sativa, affects
 - cardiovascular system of the body. $\frac{1}{2} + \frac{1}{2} = 1$

[CBSE Marking Scheme, 2011]

Detailed Answer : (i) Morphine :

(a) **Source** : Latex of unripe capsules (fruits) of poppy plant (*Papaver somniferum*).

Know the Terms

- Health : It is a state of complete physical, mental and social well-being.
- Disease : A disease can be defined as any condition that may lead to discomfort, distress, health problems or death of the affected person.
- **Congenital Diseases :** Diseases which are present since birth.
- > Acquired Diseases : Diseases which may occur after birth during one's lifetime.
- Infectious or Communicable diseases : The diseases which can be transmitted from diseased person to healthy person by means of infectious agents.
- Non-infectious or Non-communicable diseases : The diseases which cannot be transmitted from an affected individual to a healthy person.
- > **Pathogens :** Pathogens are disease causing organisms.
- Immune system : It is the system that gives immunity to the body by recognizing, responding and remembering foreign antigens.

- (b) Effect on human body : It has a sedative, analgesic and a calming effect. It is a depressant. It decreases blood pressure and depresses respiratory center.
- (ii) Cocaine :
 - (a) **Source** *Erythroxylum coca*
 - (b) Effect on human body : It is a powerful stimulant of CNS. Its higher doses causes hallucination and euphoria.
- (iii) Marijuana :
 - (a) Source : Cannabis sativa
 - (b) Effect on human body: It is hallucinogenic, affects cardiovascular system of the body and may even cause psychosis.
- Q. 10. (i) Name the drug used
 - (a) As an effective sedative & pain killer.
 - (b) For helping patients to cope with mental illness like depression but often misused.
 - (ii) How does the moderate & high doses of cocaine affect human body?

R [Foreign, 2011]

- (i) (a) Morphine.
 - **(b)** LSD (Lysergic acid dimethylamide) or Barbiturates.
- (ii) Moderate dose of cocaine have stimulating action on central nervous system. It produces a sense of euphoria and increased energy. High dosage of cocaine causes hallucinations.
- Q. 11. Why is tobacco smoking associated with rise in blood pressure and emphysema (Oxygen deficiency in the body) ? Explain.

E & A [Outside Delhi, 2011]

Ans. Tobacco stimulates the release of adrenaline hormone due to the presence of nicotine in it. This raises the blood pressure. Smoking releases carbon mono-oxide. This reduces the haem bound oxygen concentration and causes the oxygen deficiency in the body.

- > **Immunity** : It is the ability of body to protect itself from infection and disease.
- > Innate (non-specific) immunity : It is the non-specific type of defence that is present at the time of birth.
- > Acquired (specific) immunity : It is pathogen specific immunity.
- Active immunity : It is a type of acquired immunity in which the body produces its own antibodies against disease-causing antigens.
- Passive immunity : It is a type of acquired immunity in which readymade antibodies are transferred from one individual to another.
- Vaccination : It is defined as protection of the body from communicable diseases by the administration of some agents that mimic the microbe.
- > Allergy : Allergy is the exaggerated response of the immune system to certain antigens present in the environment.
- Autoimmunity : It is the memory based acquired immunity, which is able to distinguish foreign molecules or cells (pathogen) from self-cells.
- Cancer : Cancer is an abnormal and uncontrolled multiplication of cells resulting in the formation of tumor.
- > Metastasis : Metastasis is the pathological process of spreading cancerous cells to the different part of the body.
- Addiction : It is a psychological attachment to certain effects such as euphoria and a temporary feeling of wellbeing associated with drugs and alcohol.
- Dependence : It is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if regular dose of drugs/alcohol is abruptly discontinued.

