

HUMAN HEALTH AND DISEASE

Q.No	Question	Marks
Multiple Choice Question		
Q.126	<p>Enzyme-linked immunosorbent assay (ELISA) is used for testing if the patient is suffering from AIDS or not. In this test, the enzyme-linked antibodies bind to _____ in the blood sample and help in their detection. Fill in the blank -</p> <p>A. HIV DNA B. HIV RNA C. HIV antibody or antigen D. HIV reverse transcriptase</p>	1
Q.127	<p>As a part of increasing immunity against COVID-19, a small part of the virus is administered to people as a vaccine.</p> <p>Which of the following types of immunity is the above an example of?</p> <p>A. Naturally acquired active immunity B. Naturally acquired passive immunity C. Artificially acquired active immunity D. Artificially acquired passive immunity</p>	1
Q.128	<p>Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R).</p> <p>Assertion (A): <i>Salmonella</i> infects various human organs via the bloodstream.</p> <p>Reason (R): Only <i>Salmonella spp.</i> can withstand the high pH of the blood.</p> <p>Which of the following is correct?</p> <p>A. Both A and R are true, and R is the correct explanation for A. B. Both A and R are true, but R is not the correct explanation for A. C. A is true, but R is false. D. A is false, but R is true.</p>	1
Q.129	<p>During plasma transfusions from healthy persons, individuals acquire all the components present in the plasma of the healthy person.</p> <p>Which of the following types of immunity is the above an example of?</p> <p>A. Naturally-acquired active immunity B. Artificially-acquired active immunity C. Naturally-acquired passive immunity</p>	1

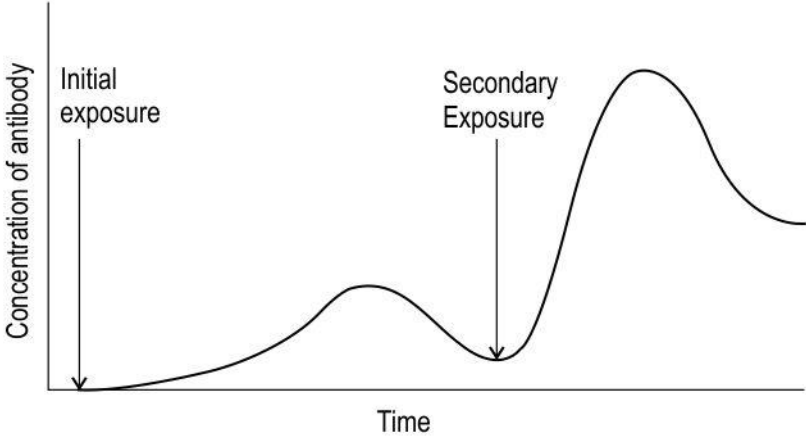
	D. Artificially-acquired passive immunity	
Q.130	<p>Complete DiGeorge Syndrome is when the child is born without the thymus. Which of the following processes is likely to be impaired in such individuals?</p> <p>A. Red blood cell production B. Thyroxine production C. Antibody production D. Antigen production</p>	1
Q.131	<p>Antibiotics are most effective against which type of infection?</p> <p>A. Filaria B. Ringworm C. Tuberculosis D. Rheumatoid arthritis</p>	1
Q.132	<p><i>- It is caused by a fungi.</i></p> <p><i>- An individual infected with it shows dry scaly lesions on various body parts.</i></p> <p>Which of the following disease do these hints refer to?</p> <p>A. Ringworm B. Filariasis C. Amoebiasis D. Ascariasis</p>	1
Q.133	<p>Which of these infections is NOT caused by a worm?</p> <p>A. Filariasis B. Ringworm C. Round worm D. Elephantiasis</p>	1
Q.134	<p>Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R).</p> <p>Assertion (A): Malignant tumors are more dangerous to the affected organism than benign tumors.</p> <p>Reason (R): Unlike malignant tumors that tend to stay localized in the same region, benign tumors spread to various body organs.</p> <p>Which of the following is correct?</p> <p>A. Both A and R are true, and R is the correct explanation for A. B. Both A and R are true, but R is not the correct explanation for A.</p>	1

	<p>C. A is true, but R is false. D. A is false, but R is true.</p>	
Q.135	<p>A research team working on a rapid diagnostic test to detect <i>Haemophilus influenzae</i> is in search of appropriate candidates to obtain patient samples.</p> <p>Patients with which of the following symptoms would serve as suitable candidates to obtain samples?</p> <p>A. Abdominal pain, fatigue, nausea and fever B. Cough, chest pain, and fever C. A history of asthma D. Swelling in the legs</p>	1
Q.136	<p>Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R).</p> <p>Assertion (A): The liver is the highest affected organ by the consumption of alcohol as compared to the other organs.</p> <p>Reason (R): Alcohol received by the liver gets chemically reduced to produce alkanes, which are very harmful.</p> <p>Which of the following is correct?</p> <p>A. Both A and R are true, and R is the correct explanation for A B. Both A and R are true, but R is not the correct explanation for A. C. A is true, but R is false. D. A is false, but R is true.</p>	1
Free Response Questions/Subjective Questions		
Q.137	<p>An individual has been consuming drugs of a specific kind which has caused high blood pressure, anxiety, paranoia, and aggressive behaviour.</p> <p>(a) Identify the class of drugs that could potentially be detected in his bloodstream.</p> <p>(b) Based on the class identified in (a), State any TWO</p> <p>(i) examples of drugs that belong to it.</p> <p>(ii) long-term physical and mental effects EACH if consumption of the drugs is continued.</p> <p>(iii) treatment or support strategies that could assist him in addressing his drug usage.</p>	5
Q.138	<p>Two patients - X and Y, who had recently consumed drugs, were brought to a rehabilitation centre. While it is established that each of them consumed either morphine or cocaine, their specific drug consumption remained undisclosed. During the mandatory tests, X exhibited heightened alertness with bouts of</p>	5



	<p>hallucinations while Y appeared drowsy. Further, the resting heart rate of X was high and that of Y was slower than normal.</p> <p>(a) Based on these observations, identify the drug that each patient is likely to have consumed.</p> <p>(b) Which category of drugs does each drug identified in (a) belong to?</p> <p>(c) Mention any THREE ways in which society's overall well-being is likely to get affected by the misuse of such drugs.</p>	
Q.139	<p>Human Immunodeficiency Virus (HIV) causes Acquired Immunodeficiency Syndrome (AIDS).</p> <p>(a) Mention any FOUR characteristics of the HIV virus that contributes to its severity?</p> <p>(b) Why is AIDS classified as a syndrome and not a disease?</p>	3
Q.140	<p>A group of researchers want to study a protein's involvement in promoting contact inhibition.</p> <p>(a) Suggest a type of cells into which they can express this protein, allowing them to evaluate the extent of its functional capabilities. Give a reason to support your answer.</p> <p>(b) Mention any FOUR factors that can lead to the formation of cells identified in (a).</p>	3
Q.141	<p>Mark the following statement as true or false and give a reason for your answer.</p> <p>Immune responses to allergens is an example of passive acquired immunity.</p>	2
Q.142	<p>HIV-infected cells continue to remain alive while the viruses are being replicated inside them and released. Describe THREE ways in which this strategy helps the viral infection process.</p>	3
Q.143	<p>Why does a malarial parasite invade red blood cells instead of other cells? Mention any THREE reasons to explain the same.</p>	3
Q.144	<p>An example of active acquired immunity is when an Rh-negative pregnant woman is given Rh immunoglobulin to prevent her immune system from reacting against Rh-positive fetal blood cells, to reduce the chances of hemolytic diseases in the newborn.</p> <p>Mark the above statement as true or false and justify your answer.</p>	2
Q.145	<p>Movement of cilia in coordinated waves to sweep mucus and trapped pathogens out of the respiratory tract is an example of passive innate immunity.</p> <p>Mark the above statement as true or false and justify your answer.</p>	2
Q.146	<p>A patient with a viral infection is showing symptoms such as cough, nasal congestion, sore throat, and tiredness and is diagnosed with the common cold.</p>	3



	<p>(a) Mention the causative agent and the mode of spreading of the disease that could result in the above symptoms and the disease.</p> <p>(b) Arrange the respiratory regions from most to least concentration of virus particles and the infected cells: trachea, bronchioles, and alveoli. Justify your answer.</p>	
Q.147	<p>From an immunological point of view, predict the consequential events arising from the following situations:</p> <p>(a) A person is transplanted with a kidney without tissue matching.</p> <p>(b) A person with the O+ blood group receives a blood transfusion from a donor with A+ blood group.</p>	2
Q.148	<p>The graph given below shows the levels of antibodies against a pathogen over a period of 30 years in a person's body.</p>  <p>(a) What do the 2 peaks mean?</p> <p>(b) Explain the reason behind the difference in the size of the 2 peaks.</p>	2
Q.149	Name the technique that relies on the difference in response to help an individual fight a disease. Explain the underlying mechanism of the technique.	1
Q.150	<p>What happens when:</p> <p>(a) A newborn is not breastfed.</p> <p>(b) A tumour cell enters the bloodstream.</p>	2
Q.151	The image depicts the transmission of Leishmaniasis, a disease prevalent in the tropics and sub-tropics of Africa, Asia, the Americas, and southern Europe. The symptoms include skin ulcers, fever, low erythrocyte count, and enlarged spleen and liver.	2



	<div style="text-align: center;"> </div> <p>Based on the image, identify the:</p> <ol style="list-style-type: none"> Pathogen Vector Host 	
Q.152	<p>Mark the following statements as TRUE or FALSE, and support your answer with a reason.</p> <ol style="list-style-type: none"> Vector-borne diseases are caused only by protozoans. All infectious diseases caused by bacteria spread through air. Only infectious diseases are caused by virus. 	3
Q.153	<p>An infection with <i>Wuchereria bancrofti</i> leads to symptoms such as swollen lymph nodes.</p> <ol style="list-style-type: none"> What are the hosts that <i>Wuchereria bancrofti</i> resides in? Give TWO reasons why the lymphatic system provides a better environment for <i>Wuchereria bancrofti</i> than the circulatory system. 	3

Answer key and Marking Scheme

Q.No	Answers	Marks
Q.126	C. HIV antibody or antigen	1
Q.127	C. Artificially acquired active immunity	1
Q.128	C. A is true, but R is false.	1
Q.129	D. Artificially-acquired passive immunity	1
Q.130	C. Antibody production	1
Q.131	C. Tuberculosis	1
Q.132	A. Ringworm	1
Q.133	A. Filariasis	1
Q.134	C. A is true, but R is false.	1
Q.135	B. Cough, chest pain, and fever	1
Q.136	C. A is true, but R is false.	1
Q.137	<p>(a) The class of drugs that could potentially be detected in his blood is stimulants. <i>[1 mark]</i></p> <p>(b) (i) <i>[0.5 marks each for any two of the following]:</i></p> <ul style="list-style-type: none"> - Cocaine - Nicotine - Caffeine - Ephedrine - Amphetamines <p>(b) (ii)</p> <p><i>[0.5 marks each for any two of the following physical effects]:</i></p> <ul style="list-style-type: none"> - Respiratory problems - Cardiovascular problems like heart strokes - Liver damage 	5



	<ul style="list-style-type: none"> - Kidney damage - Gastrointestinal problems like ulcers, and acidity. <p><i>[0.5 marks each for any two of the following mental effects]:</i></p> <ul style="list-style-type: none"> - Higher risk of suicidal thoughts - Depression and anxiety - Loneliness due to loss of relationships - lower attention span - Mood swings <p>(b) (iii)</p> <p><i>[0.5 marks each for any two of the following]:</i></p> <ul style="list-style-type: none"> - Counselling - Help from support groups and proper education - Help from family members and friends - Medication - Rehabilitation programs <p><i>[Accept any other valid answers for the above questions and provide marks for the same]</i></p>	
Q.138	<p>(a) 0.5 marks each for each of the following:</p> <ul style="list-style-type: none"> - X - Cocaine - Y - Morphine <p>(b) 0.5 marks each for each of the following:</p> <ul style="list-style-type: none"> - Cocaine - Coka alkaloids - Morphine - Opioids <p>(c) 1 mark each for any THREE of the following:</p> <ul style="list-style-type: none"> - Increase in crime rate - Increase in the number of unhealthy people due to short-term and long-term effects of drugs 	5

	<ul style="list-style-type: none"> - Burden on healthcare systems - Disruption in relationships with family and friends - Reduction in educational attainment and workforce productivity <p><i>[Accept any other valid answer]</i></p>	
Q.139	<p>(a) 1 mark each for the following:</p> <ul style="list-style-type: none"> - While different viruses attack various organ systems, HIV targets the immune cells such as T cells, impairing the immune response, and making the body more susceptible to infections and cancers. - It has a higher mutation rate that helps its rapid evolution and the emergence of new variants that can evade immune responses and antiretroviral drugs. - HIV integrates its genetic material into the host cell's genome, making it difficult for the immune system to eliminate infected cells. This allows the virus to persist in the body over time. - HIV causes a latent infection in some cells, where it remains inactive and hidden from the immune system. This latent reservoir makes complete eradication of the virus extremely challenging. <p><i>[Accept any other valid answers]</i></p> <p>(b) AIDS is a collection of symptoms/diseases rather than a single distinct condition.</p>	3
Q.140	<p>(a) 0.5 marks for each of the following:</p> <ul style="list-style-type: none"> - Tumor/Cancerous cells - Expressing them in tumour cells will help in identifying their ability to promote contact inhibition as these cells already have lost that property. <p>(b) 0.5 marks for each of the following points:</p> <ul style="list-style-type: none"> - Ionising radiations like X-rays and gamma rays - Non-ionizing radiations like UV rays - Chemical carcinogens - Infection by oncogenic viruses <p><i>[Accept any other valid answers.]</i></p>	3
Q.141	False	2



	<p>Immune responses to allergens involve the production of specific antibodies leading to allergic reactions and is not the result of receiving pre-formed antibodies. Hence, it is an example of active acquired immunity but not passive acquired immunity.</p> <p><i>[No marks to be awarded if the correct justification is not provided.]</i></p>	
Q.142	<p>1 mark each for any THREE of the following:</p> <ul style="list-style-type: none"> - Infected cells provide a protected environment where the virus can constantly replicate and assemble new viral particles. - Infected cells help the viral particles in evading immune detection. - Some infected cells enter a latent state, allowing the virus to persist without active replication. - The slow release of viruses from infected cells ensures a continuous supply of virus particles, increasing the chances of infecting neighbouring cells and spreading the infection. <p><i>[Accept any other valid answers]</i></p>	3
Q.143	<p><i>[1 mark each for any THREE of the following]</i></p> <p><i>[Accept any other valid answers]</i></p> <p>Attacking the red blood cells of the human hosts helps the plasmodium in -</p> <ul style="list-style-type: none"> - evade detection by the immune system - access nutrients and oxygen-carrying haemoglobin - development of sexual-stage parasites (gametocytes) in red blood cells ensuring that the parasite can continue its life cycle in the mosquito host. - the periodic release of merozoites leads to synchronized cycles of fever in the host, increasing the likelihood of mosquito feeding during a period when the gametocytes are present, facilitating transmission. 	3
Q.144	<p>False</p> <p>An Rh-negative pregnant woman does not produce any antibodies, but receives Rh immunoglobulin containing pre-formed antibodies against Rh-positive blood cells from an external source. This is not an example of active acquired immunity but is an example of passive acquired immunity</p>	2
Q.145	<p>False</p> <p>It is an active physical defense mechanism that helps to prevent the entry and build-up of pathogens in the respiratory system and does not involve any</p>	2



	external source of immune components. Thus it is an example of active innate immunity.	
Q.146	<p>(a) 0.5 marks for each of the following:</p> <ul style="list-style-type: none"> - Rhinovirus - spread if the droplets resulting from the cough or sneezes of an infected person are inhaled or through shared contaminated items <p>(b) [1 mark for the sequence of organs and 1 mark for justification]</p> <ul style="list-style-type: none"> - Trachea>Bronchioles>alveoli - Rhinovirus attaches and infects cells in the upper respiratory tract, and typically does not reach this deep into the respiratory system. 	3
Q.147	<p>(a) Immune system may recognize the kidney as foreign and a cell-mediated immune response develops that can lead to inflammation, tissue damage, and rejection of the transplanted organ.</p> <p>(b) Anti-A antibodies in the recipient's plasma will react with A antigens on the transfused red blood cells, causing agglutination, hemolytic reaction, and possible tissue damage.</p>	2
Q.148	<p>(a) The two peaks represent primary and secondary immune responses/the increase in antibody levels in the blood due to infection.</p> <p>(b) The difference in peak sizes is due to memory cells: the primary response takes time to recognize the pathogen and generate antibodies, while memory cells formed during this response enable a faster and stronger secondary response, producing a larger peak.</p>	2
Q.149	<p>1 mark for each of the following:</p> <ul style="list-style-type: none"> - Vaccination. - Vaccination uses harmless pathogen components to trigger memory cells for a rapid, potent immune response upon real pathogen exposure, aiding in the fight against the actual pathogen. 	1
Q.150	<p>(a) Lack of breastfeeding in new-borns can result in lower passive immunity, potentially increasing susceptibility to infections due to the absence of protective factors present in breast milk.</p> <p>(b) A tumour cell that enters the bloodstream can reach a distant tissue and possibly form a secondary tumour, or metastasis, in that location.</p>	2
Q.151	a) <i>LEISHMANIA</i> or protozoa	2



	<p>b) Sandfly</p> <p>c) 0.5 marks for each of the following:</p> <ul style="list-style-type: none"> - human - sandfly 	
Q.152	<p>(i) 0.5 marks for each of the following:</p> <ul style="list-style-type: none"> - FALSE - Elephantiasis is a vector-borne disease caused by worms. <p>(ii) 0.5 marks for each of the following:</p> <ul style="list-style-type: none"> - FALSE - Typhoid is caused by a bacterium and it spreads through contaminated food and water. <p>0.5 marks for each of the following:</p> <ul style="list-style-type: none"> - FALSE - Some forms of cancer are caused by oncogenic viruses. 	3
Q.153	<p>(a) The hosts that <i>Wuchereria bancrofti</i> resides in, are as follows [0.5 marks each for the following]:</p> <ul style="list-style-type: none"> - Humans - Mosquitoes <p>(b) The lymphatic system offers a more favourable environment for <i>Wuchereria bancrofti</i> as compared to the circulatory system because of the following reasons [1 mark each for any two of the following reasons]:</p> <ul style="list-style-type: none"> - The slower flow rate of the lymphatic system as compared to the circulatory system makes it a more stable environment for the parasite to thrive in. - As the lymphatic system contains fewer immune cells than the circulatory system, parasites residing in it can evade detection by the immune system. - As compared to blood, the lymphatic fluid is a more constant source of lipids, proteins and other essential nutrients needed for the growth of <i>Wuchereria bancrofti</i>. <p>[Accept any other valid answer]</p>	3