Human Health and Disease

Standard difficulty · 20 questions · 40 marks · Time: 42 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer 8 × 1 = 8 marks

1. Typhoid fever is confirmed by the:
(a) Western blot **(b)** Mantoux test **(c)** ELISA test **(d)** Widal test

2. Which disease is caused by the protozoan Plasmodium (P. vivax, P. malariae, P. falciparum)?
(a) Malaria **(b)** AIDS **(c)** Chikungunya **(d)** Ringworm

3. Malaria usually spreads through:
(a) sexual contact, transfusion of infected blood, shared needles, or from mother to child
(b) contaminated food and water
(c) the bite of an infected female Anopheles mosquito
(d) droplets from an infected person, or sharing glasses and utensils

4. Which kind of immunity is shown by the skin and the mucous membranes?
(a) innate immunity (a physical barrier) **(b)** active immunity (artificial: a vaccine)
(c) innate immunity (a cytokine barrier) **(d)** cell-mediated immunity (T lymphocytes)

5. What is the effect of nicotine?
(a) cause hallucinations
(b) affect the cardiovascular system
(c) interferes with dopamine transport; a stimulant that can cause hallucinations
(d) makes the adrenal gland release adrenaline and noradrenaline, raising blood pressure and heart rate

6. Each antibody molecule is H_2L_2. The number of heavy chains in 7 antibody molecules is:
(a) 14 **(b)** 56 **(c)** 7 **(d)** 28

7. Which term describes a tumour that stays in its original place and does little damage?
(a) Primary lymphoid organs **(b)** A vaccine
(c) A benign tumour **(d)** Haemozoin

8. Assertion (A): Dengue does not spread through the bite of an infected Aedes mosquito.
Reason (R): A mosquito that bites an infected person picks up the pathogen and passes it on at its next bite.
(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

Section B — Short answer — 8 × 2 = 16 marks

9. What is meant by health?

10. Name the pathogen of filariasis (elephantiasis) and of pneumonia, and say how each spreads.

11. A sample contains 27 antibody molecules. How many heavy chains, light chains and antigen-binding sites are there? Which cells produce antibodies?

12. What kind of immunity is shown by (i) snake antivenom given after a bite and (ii) an injection of anti-tetanus serum after a deep wound?

13. In the life cycle of Plasmodium, where does each of these happen: (a) gametocytes develop; (b) sporozoites enter the human body?

14. Give the source and the effect of (i) barbiturates, amphetamines and benzodiazepines and (ii) Atropa belladonna and Datura.

15. Explain (a) a vaccine and (b) haemozoin.

16. Give the main symptoms of chikungunya and one way to prevent it.

Section C — Word problems — 4 × 4 = 16 marks

17. Describe the life cycle of Plasmodium.

18. Compare ringworm, filariasis (elephantiasis), dengue under these heads: pathogen, mode of spread, symptoms and prevention.

19. Describe the structure of an antibody. In 19 molecules of IgG, how many polypeptide chains and antigen-binding sites are there? Distinguish between humoral and cell-mediated immunity.

20. Discuss alcohol (heavy use) and Atropa belladonna and Datura: the source and effect of each. List three warning signs of drug or alcohol abuse in adolescents and two ways to prevent it.

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Answer key

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Q	Answer	Working
1	**(d) Widal test**	—
2	**(a) Malaria**	—
3	**(c) the bite of an infected female Anopheles mosquito**	—
4	**(a) innate immunity (a physical barrier)**	—
5	**(d) makes the adrenal gland release adrenaline and noradrenaline, raising blood pressure and heart rate**	—
6	**(a) 14**	each molecule has 2 heavy and 2 light chains, and 2 antigen-binding sites
7	**(c) A benign tumour**	—
8	**(d) A is false, but R is true.**	A is false: dengue is caused by the dengue virus and spreads through the bite of an infected Aedes mosquito. R is true.
9	**Health is a state of complete physical, mental and social well-being, not merely the absence of disease.**	—
10	**filariasis (elephantiasis): the filarial worms Wuchereria bancrofti and W. malayi, through the bite of an infected female Culex mosquito; pneumonia: the bacteria Streptococcus pneumoniae and Haemophilus influenzae, through droplets from an infected person, or sharing glasses and utensils**	—
11	**54 heavy chains, 54 light chains, 54 antigen-binding sites; B lymphocytes (plasma cells)**	each antibody is H_2L_2 with two antigen-binding sites
12	**(i) passive immunity (artificial: ready-made antibodies); (ii) passive immunity (artificial: ready-made antibodies)**	active: the body makes its own antibodies; passive: ready-made antibodies are given
13	**(a) in the red blood cells of the human; (b) through the bite of an infected female Anopheles mosquito**	the human is the intermediate host; the female Anopheles mosquito is the definitive host
14	**(i) medicines prescribed for depression and insomnia; are habit-forming when misused. (ii) plants with hallucinogenic properties; cause hallucinations**	—

Q	Answer	Working
15	**(a) An inactivated or weakened pathogen, or its antigen, that makes the body produce antibodies and memory cells; (b) a toxin released when infected red blood cells burst in malaria**	—
16	**Fever with severe, often long-lasting joint pain. Prevention: removing stagnant water where Aedes breeds**	—
17	**Sporozoites enter the human with the bite of an infected female Anopheles. They multiply asexually in liver cells and then in red blood cells, which burst and release haemozoin, causing chill and high fever every 3–4 days. Some parasites form gametocytes in the red blood cells. A female Anopheles takes these up with blood; fertilisation and development occur in its gut, and the sporozoites formed move to its salivary glands, ready to infect the next human.**	—
18	**Ringworm: fungi of the genera Microsporum, Trichophyton and Epidermophyton; spreads through soil, or towels, clothes and combs of an infected person; dry, scaly lesions on the skin, nails and scalp with intense itching; prevented by keeping skin dry and not sharing towels or combs. Filariasis (elephantiasis): the filarial worms Wuchereria bancrofti and W. malayi; spreads through the bite of an infected female Culex mosquito; chronic inflammation of lymphatic vessels, usually of the legs, causing gross swelling; prevented by controlling mosquitoes and avoiding their bites. Dengue: the dengue virus; spreads through the bite of an infected Aedes mosquito; high fever, severe headache and joint and muscle pain; prevented by removing stagnant water where Aedes breeds**	—
19	**Each antibody is Y-shaped, with two heavy and two light polypeptide chains (H_2L_2) and two antigen-binding sites. 19 molecules have 76 chains and 38 binding sites. Humoral immunity is due to antibodies made by B lymphocytes in the blood and lymph; cell-mediated immunity is due to T**	NCERT treats each antibody type as a single H_2L_2 unit

Q	Answer	Working
	lymphocytes, and causes graft rejection	
20	**Alcohol (heavy use): fermentation of sugars; damages the liver (cirrhosis) and the nervous system. Atropa belladonna and Datura: plants with hallucinogenic properties; cause hallucinations. Warning signs: falling school performance, absence from school, loss of interest in hygiene and hobbies, withdrawal, changes in sleep and eating habits, aggressive behaviour. Prevention: avoid undue peer pressure, education and counselling, seeking help from parents and peers, watching for danger signs, professional and medical help**	—

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