

# Human Health & Disease — NEET Zoology Mastery Pack

NCERT Class XII Biology, Unit VIII (Biology and Human Welfare) · Chapter 7 in the rationalised NCERT (Chapter 8 in pre-2023 editions) · Prepared for Aamirah

## Part 1 — Why this chapter is a "zero-miss" chapter

NEET typically pulls **2-4 questions** from this chapter, and almost every one of them is a **direct NCERT line**: an organism name, a site of infection, a number, a vector, or a chemical. There is very little reasoning to do — which means a miss here is purely a memory failure, not a concept failure. That is fixable with a fixed protocol.

**Official NEET syllabus scope for this chapter:** Pathogens and parasites causing human diseases (malaria, filariasis, ascariasis, typhoid, pneumonia, common cold, amoebiasis, ringworm, **dengue, chikungunya**); basic concepts of immunology and vaccines; cancer; HIV and AIDS; adolescence, drug and alcohol abuse. Note that dengue and chikungunya are named in the NTA/NMC syllabus even though NCERT treats them only in passing — cover their vector (*Aedes aegypti*) and viral nature.

## The 7-day mastery cycle

| Day   | Task                       | How to do it (this is the part that matters)                                                                                                                                                                                         |
|-------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Day 0 | Cold diagnostic            | Take the 45-question test in Part 3 <i>before</i> studying. 45 minutes, no book. Score it with NEET marking (+4 / -1). The score does not matter; the <b>error list</b> does.                                                        |
| Day 1 | NCERT read #1 — narrative  | Read the whole chapter start to finish without highlighting. Goal: know the shape of the chapter (5 blocks: diseases → immunity → AIDS → cancer → drugs).                                                                            |
| Day 2 | NCERT read #2 — extraction | Read with a pencil. Circle <b>every italicised scientific name, every number, every proper noun, every vector, every symptom list</b> . These are the question banks. Nothing else in the chapter has ever been asked.               |
| Day 3 | Build the tables           | Rewrite Part 2 of this pack <i>from memory</i> , on blank paper. Then correct in red pen. Blank-paper recall beats re-reading by a wide margin.                                                                                      |
| Day 4 | Figures + captions         | Redraw and label: antibody structure (H <sub>2</sub> L <sub>2</sub> ), the <i>Plasmodium</i> life cycle, HIV replication cycle. Read every figure caption and every table in the chapter aloud — NEET lifts questions from captions. |
| Day 5 | PYQ drill                  | Do 10 years of previous-year questions from this chapter in one sitting. For each wrong answer, write the exact NCERT sentence that contained the answer into an error log.                                                          |
| Day 6 | Retest                     | Retake this same 45-question test. Target: <b>44/45 or better</b> . Anything below that means a specific block is weak — go back to that block only.                                                                                 |
| Day 7 | Compress                   | Reduce the whole chapter to one A4 sheet in her own handwriting. That sheet is what she revises later — never the textbook again.                                                                                                    |

## The spaced-revision loop (this is what prevents the miss in the actual exam)

Mastery on Day 7 decays. Revise the one-page sheet on **Day 10, Day 24, Day 55, Day 120**, and then every fortnight in the final three months. Each revision should take under 12 minutes. Re-take the 45-question test once a month; the aim is a stable 45/45, not a first-time 45/45.

## The five "zero-miss" rules

- Line-level fidelity.** If NCERT says "sustained high fever (39° to 40°C)", learn the numbers. NEET has asked exactly that.
- Never learn a disease alone.** Always learn the quartet: *pathogen* → *vector/mode* → *site in body* → *hallmark symptom*. Most NEET questions are a mismatch in one of those four slots.
- Learn the exceptions loudly.** Rhino viruses do *not* infect the lungs. Thymus is *primary*, not secondary. Male *Anopheles* does not transmit malaria. These are the traps.
- Do assertion-reason and match-the-column formats deliberately.** Since 2024 NEET leans heavily on statement-based questions, where partial knowledge scores zero.
- Keep an error log, not a notebook.** One line per mistake, with the NCERT sentence. Read only the log before the exam.

## Part 2 — High-yield fact sheet (memorise cold)

### 2.1 Common diseases

| Disease                        | Causative organism                                                                                     | Transmission / vector                                             | Site & hallmark features                                                                                                                                                                                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Typhoid                        | <i>Salmonella typhi</i> (bacterium)                                                                    | Contaminated food and water                                       | Small intestine → blood → other organs. Sustained fever 39–40°C, weakness, stomach pain, constipation, headache, loss of appetite; intestinal perforation in severe cases. <b>Widal test</b> . Typhoid Mary (Mary Mallon) — a cook, famous carrier. |
| Pneumonia                      | <i>Streptococcus pneumoniae</i> , <i>Haemophilus influenzae</i>                                        | Inhaling droplets/aerosols; sharing glasses and utensils          | Alveoli fill with fluid → severe respiratory difficulty. Fever, chills, cough, headache; lips and finger nails may turn <b>grey to bluish</b> .                                                                                                     |
| Common cold                    | <b>Rhino viruses</b>                                                                                   | Droplets, contaminated objects                                    | Nose and respiratory passage <b>but not the lungs</b> . Nasal congestion and discharge, sore throat, hoarseness, cough, headache, tiredness; lasts 3–7 days.                                                                                        |
| Malaria                        | <i>Plasmodium vivax</i> , <i>P. malariae</i> , <i>P. falciparum</i> (most serious — malignant malaria) | Bite of <b>female Anopheles</b>                                   | Liver cells → RBCs. Rupture of RBCs releases <b>haemozoin</b> → chill and high fever recurring every 3–4 days. Digenetic (human + mosquito).                                                                                                        |
| Amoebiasis (amoebic dysentery) | <i>Entamoeba histolytica</i> (protozoan)                                                               | Contaminated food/water; <b>houseflies as mechanical carriers</b> | Large intestine. Constipation, abdominal pain and cramps, stools with excess mucous and blood clots.                                                                                                                                                |
| Ascariasis                     | <i>Ascaris lumbricoides</i> (roundworm)                                                                | Eggs in faeces → soil, water, plants, vegetables                  | Small intestine. Internal bleeding, muscular pain, fever, anaemia, blockage of intestinal passage.                                                                                                                                                  |
| Filariasis / Elephantiasis     | <i>Wuchereria bancrofti</i> , <i>W. malayi</i>                                                         | Female <b>Culex</b> mosquito                                      | Lymphatic vessels of lower limbs; chronic inflammation → gross deformity. Genital organs often also affected.                                                                                                                                       |
| Ringworm                       | <i>Microsporum</i> , <i>Trichophyton</i> , <i>Epidermophyton</i> (fungi)                               | Soil; sharing towels, clothes, combs                              | Skin, nails, scalp. Dry, scaly lesions with intense itching. Heat and moisture favour growth.                                                                                                                                                       |
| Dengue / Chikungunya           | Viruses                                                                                                | <b>Aedes aegypti</b>                                              | Named explicitly in the NEET syllabus. Both are arboviral.                                                                                                                                                                                          |

### 2.2 Immunity

| Concept                    | Must-know detail                                                                                                                                           |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Innate — physical barriers | Skin; mucus coating of epithelium lining respiratory, gastrointestinal and urogenital tracts.                                                              |
| Innate — physiological     | Acid in the stomach, saliva in the mouth, tears from eyes.                                                                                                 |
| Innate — cellular          | PMNL–neutrophils, monocytes and natural killer lymphocytes in blood; macrophages in tissues.                                                               |
| Innate — cytokine          | <b>Interferons</b> secreted by virus-infected cells protect non-infected cells.                                                                            |
| Antibody structure         | Four peptide chains: two light + two heavy → <b>H<sub>2</sub>L<sub>2</sub></b> . Types: IgA, IgM, IgB(IgD), IgE, IgG.                                      |
| Humoral vs cell-mediated   | B-lymphocytes produce antibodies (humoral). T-lymphocytes mediate CMI and <i>help</i> B-cells produce antibodies. <b>Graft rejection = cell-mediated</b> . |
| Active immunity            | Slow, own antibodies, takes time; via infection or vaccination.                                                                                            |
| Passive immunity           | Ready-made antibodies: <b>colostrum → IgA</b> ; <b>mother to foetus through placenta → IgG</b> ; tetanus antitoxin; snake antivenom.                       |
| Primary lymphoid organs    | <b>Bone marrow and thymus</b> — where immature lymphocytes mature into antigen-sensitive lymphocytes.                                                      |
| Secondary lymphoid organs  | Spleen, lymph nodes, tonsils, <b>Peyer's patches</b> of small intestine, appendix.                                                                         |
| Spleen                     | Large bean-shaped organ; lymphocytes and phagocytes; filters blood by trapping blood-borne micro-organisms; large reservoir of erythrocytes.               |
| Thymus                     | Lobed; quite large at birth, keeps reducing in size with age; by puberty it is very small.                                                                 |
| MALT                       | Mucosa-associated lymphoid tissue — about <b>50%</b> of the lymphoid tissue in the human body.                                                             |
| Allergy                    | Antibody: <b>IgE</b> . Chemicals released from <b>mast cells: histamine and serotonin</b> . Drugs: anti-histamine, adrenalin, steroids.                    |
| Autoimmunity               | Body attacks self-cells. Example given in NCERT: <b>rheumatoid arthritis</b> .                                                                             |

### 2.3 AIDS

- **HIV** = human immunodeficiency virus; a **retrovirus** with an RNA genome and a protective protein coat.
- Sequence: virus enters **macrophages** → **reverse transcriptase** makes viral DNA from RNA → viral DNA incorporated into host cell DNA → host cell directed to produce virus particles. The macrophage acts as an **HIV factory**. HIV simultaneously enters **helper T-lymphocytes**, replicates, and progressively reduces their number.
- Transmission: sexual contact with an infected person; transfusion of contaminated blood; sharing infected needles; from infected

mother to child through the **placenta**. **Not** spread by touching, hugging, or shaking hands.

- Time lag between infection and symptoms: a few months to many years (usually **5-10 years**).
- Diagnosis: **ELISA**. Treatment: **anti-retroviral drugs** — only partially effective; can prolong life but cannot prevent death.
- Agency: **NACO** (National AIDS Control Organisation) and NGOs run awareness programmes; WHO's programme on AIDS control.

## 2.4 Cancer

- Normal cells show **contact inhibition**; cancer cells lose it and divide continuously → mass of cells (tumour).
- **Benign** tumours: remain confined to their original location, little damage. **Malignant**: mass of proliferating cells (neoplastic/tumour cells), invade and damage surrounding tissue, starve normal cells by competing for nutrients.
- **Metastasis** — cells sloughed from a malignant tumour reach distant sites through blood and start a new tumour. Most feared property.
- Carcinogens: **physical** — ionising radiations (X-rays, gamma rays) and non-ionising (**UV**); **chemical** — e.g. tobacco smoke (lung cancer); **biological** — oncogenic viruses with **viral oncogenes**. Cellular **proto-oncogenes** when activated under certain conditions become **oncogenes**.
- Detection: **biopsy and histopathological studies**; blood and bone marrow tests for leukaemias; **radiography (X-ray), CT, MRI**. CT uses X-rays to give a three-dimensional image; **MRI uses strong magnetic fields and non-ionising radiations**. Antibodies against cancer-specific antigens; molecular biology techniques to detect inherited susceptibility genes.
- Treatment: surgery, radiotherapy, chemotherapy (drugs have side effects), and **biological response modifiers such as  $\alpha$ -interferon**, which activates the immune system to destroy the tumour.

## 2.5 Drugs and alcohol abuse

| Drug                                                                                                      | Source                                                                                                             | Receptor / action                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Opioids</b> — heroin (smack) = <b>diacetylmorphine</b> , white, odourless, bitter crystalline compound | Obtained by <b>acetylation of morphine</b> , extracted from the latex of the poppy plant <i>Papaver somniferum</i> | Bind to opioid receptors present principally in the <b>CNS and gastrointestinal tract</b> . <b>Depressant</b> — slows down body functions. Morphine itself is an effective sedative and painkiller.                                                                                                                                                       |
| <b>Cannabinoids</b> — marijuana, hashish, charas, ganja                                                   | <b>Inflorescences</b> of <i>Cannabis sativa</i> (flower tops, leaves, resin)                                       | Cannabinoid receptors principally in the <b>brain</b> . Mainly affect the <b>cardiovascular system</b> . Abused by some sportspersons.                                                                                                                                                                                                                    |
| <b>Coca alkaloid / cocaine</b> (coke, crack)                                                              | <i>Erythroxylum coca</i> , native to South America                                                                 | Interferes with the transport of the neurotransmitter <b>dopamine</b> . Potent CNS <b>stimulant</b> → euphoria and increased energy; excess causes hallucinations.                                                                                                                                                                                        |
| <b>Hallucinogenic plants</b>                                                                              | <i>Atropa belladonna</i> , <i>Datura</i>                                                                           | Named in NCERT as having hallucinogenic properties.                                                                                                                                                                                                                                                                                                       |
| <b>Tobacco</b>                                                                                            | <i>Nicotiana tabacum</i> — contains <b>nicotine</b>                                                                | Stimulates the <b>adrenal gland</b> to release <b>adrenaline and nor-adrenaline</b> → raise blood pressure and increase heart rate. Smoking → lung cancer, bronchitis, emphysema, coronary heart disease, gastric ulcer. Chewing → cancer of oral cavity and throat. Smoking raises <b>CO</b> in blood and reduces haem-bound oxygen → oxygen deficiency. |

**Also fixed facts:** adolescence = 12-18 years, a bridge between childhood and adulthood. Common causes of abuse: curiosity, adventure/excitement, experimentation, stress, peer pressure, unstable family structure. Symptoms: drop in academic performance, unexplained absence, withdrawal, isolation, aggressive behaviour, change in sleeping and eating habits, fluctuating weight and appetite. **Withdrawal syndrome** appears when regular use is abruptly discontinued. Prevention: avoid undue peer pressure, education and counselling, seeking help from parents and peers, professional and medical help.

## Part 3 — Full Chapter Test

**Subject:** Zoology — Human Health and Disease | **Questions:** 45 | **Maximum marks:** 180

**Time allowed:** 45 minutes | **Marking scheme:** +4 for a correct answer, –1 for an incorrect answer, 0 if unattempted.

**Instructions:** Attempt all questions. Only one option is correct. Do not refer to any book or notes. Record answers on a separate sheet, then check against Part 4.

1. Which one of the following is correctly matched (disease – pathogen – vector)?  
(a) Filariasis – *Wuchereria bancrofti* – female *Culex* (b) Malaria – *Plasmodium vivax* – male *Anopheles*  
(c) Amoebiasis – *Entamoeba histolytica* – female *Aedes* (d) Ringworm – *Epidermophyton* – housefly
2. The toxic substance released when infected red blood cells rupture, and which is responsible for the chill and high fever of malaria, is:  
(a) Haemocyanin (b) Haemozoin  
(c) Bilirubin (d) Histamine
3. In the life cycle of *Plasmodium*, the stage infective to humans and the stage infective to the mosquito are respectively:  
(a) Gametocytes and sporozoites (b) Merozoites and trophozoites  
(c) Sporozoites and gametocytes (d) Trophozoites and merozoites
4. Widal test is used for the confirmation of:  
(a) Pneumonia (b) Amoebiasis  
(c) Filariasis (d) Typhoid
5. Consider the following statements about typhoid:  
I. *Salmonella typhi* generally enters the small intestine through contaminated food and water.  
II. The pathogen migrates to other organs through the blood.  
III. Intestinal perforation and death may occur in severe cases.  
IV. Mary Mallon, nicknamed Typhoid Mary, was a cook who spread the disease through the food she prepared.  
Which of the above are correct?  
(a) I and II only (b) I, II and III only  
(c) II, III and IV only (d) I, II, III and IV
6. Which statement about pneumonia is **incorrect**?  
(a) It is caused by *Streptococcus pneumoniae* and *Haemophilus influenzae* (b) The alveoli get filled with fluid, causing severe respiratory difficulty  
(c) In severe cases the lips and finger nails may turn grey to bluish (d) It spreads exclusively through contaminated food and water
7. Rhino viruses infect:  
(a) Only the lungs (b) The nose and respiratory passage but not the lungs  
(c) The liver and then the lungs (d) The lymph nodes of the neck
8. Houseflies act as mechanical carriers of the pathogen causing:  
(a) Malaria (b) Ringworm  
(c) Amoebiasis (d) Common cold
9. Internal bleeding, muscular pain, fever, anaemia and blockage of the intestinal passage are the symptoms of:  
(a) Ascariasis (b) Amoebiasis  
(c) Typhoid (d) Filariasis
10. Ringworm is caused by which of the following groups?  
(a) *Trichophyton*, *Epidermophyton*, *Microsporum* (b) *Trichoderma*, *Aspergillus*, *Rhizopus*  
(c) *Candida*, *Penicillium*, *Mucor* (d) *Salmonella*, *Streptococcus*, *Haemophilus*
11. **Assertion (A):** Elephantiasis is marked by gross deformity of the lower limbs.  
**Reason (R):** *Wuchereria* causes chronic inflammation of the lymphatic vessels of the affected part.  
(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
12. Dengue and chikungunya are transmitted to humans by:  
(a) Female *Anopheles* (b) Female *Culex*  
(c) *Aedes* mosquitoes (d) Sandflies
13. Match List-I with List-II:  
List-I: A. *Ascaris* B. *Entamoeba* C. *Plasmodium* D. *Wuchereria*  
List-II: (i) Lymphatic vessels (ii) Liver cells and RBCs (iii) Small intestine (iv) Large intestine  
(a) A-iii, B-iv, C-ii, D-i (b) A-iv, B-iii, C-i, D-ii  
(c) A-iii, B-ii, C-iv, D-i (d) A-i, B-iv, C-ii, D-iii
14. Which of the following is a **physiological barrier** of innate immunity?  
(a) Mucus coating of the epithelium (b) Acid in the stomach  
(c) Interferons (d) Natural killer lymphocytes
15. PMNL–neutrophils, monocytes and natural killer lymphocytes of the blood, together with macrophages in tissues, constitute the:  
(a) Physical barrier (b) Physiological barrier  
(c) Cellular barrier (d) Cytokine barrier
16. Interferons are:  
(a) Secreted by virus-infected cells and protect non-infected cells (b) Antibodies secreted by B-cells against viruses  
(c) Secreted by mast cells during allergy (d) Enzymes that digest bacterial cell walls in the stomach
17. An antibody is represented as  $H_2L_2$  because each molecule consists of:  
(a) Two heavy and two light chains (b) Two heavy and two long chains  
(c) Four heavy and two light chains (d) Two haptens and two ligands

18. The antibody present in colostrum and the antibody transferred from mother to foetus across the placenta are respectively:
- IgG and IgA
  - IgA and IgG
  - IgE and IgM
  - IgM and IgE
19. Which of the following is an example of **passive immunisation**?
- BCG vaccination in a newborn
  - Administering a toxoid before exposure
  - Injecting preformed antitoxin to a person with tetanus
  - Recovery from chickenpox conferring lifelong protection
20. Rejection of a transplanted kidney by the recipient's body is chiefly due to:
- Humoral immune response
  - Cell-mediated immune response
  - Innate cytokine barrier
  - Passive immunity
21. The primary lymphoid organs in humans are:
- Spleen and lymph nodes
  - Bone marrow and thymus
  - Tonsils and appendix
  - Thymus and spleen
22. Which of the following is **not** a secondary lymphoid organ?
- Spleen
  - Peyer's patches of the small intestine
  - Thymus
  - Tonsils
23. Which statement about the spleen is correct?
- It is a lobed organ that shrinks markedly after puberty
  - It filters blood by trapping blood-borne micro-organisms and acts as a reservoir of erythrocytes
  - It is the site where immature lymphocytes acquire antigen specificity
  - It traps micro-organisms entering the lymph rather than the blood
24. Mucosa-associated lymphoid tissue (MALT) constitutes about what percentage of the lymphoid tissue in the human body?
- 10%
  - 20%
  - 50%
  - 80%
25. During an allergic reaction, the chemicals released from mast cells and the class of antibody produced are:
- Histamine and serotonin; IgE
  - Histamine and serotonin; IgG
  - Interferon and histamine; IgA
  - Serotonin and adrenaline; IgM
26. Rheumatoid arthritis is caused by:
- An allergic reaction to pollen
  - A bacterial infection of joint cavities
  - The immune system attacking self-cells
  - Deficiency of T-lymphocytes
27. HIV is classified as a retrovirus because it:
- Has an RNA genome that is reverse transcribed into DNA
  - Reverses the polarity of the host cell membrane
  - Has a DNA genome transcribed into RNA
  - Replicates only in the reverse direction along the host chromosome
28. After entering the human body, HIV first replicates in and is mass-produced by:
- Erythrocytes
  - Macrophages, which act as an HIV factory
  - Neutrophils
  - Hepatocytes
29. The test most widely used for the diagnosis of AIDS is:
- Widal test
  - Biopsy
  - ELISA
  - MRI
30. Which of the following is **not** a mode of transmission of HIV?
- Transfusion of contaminated blood
  - Sharing infected needles
  - Shaking hands and hugging
  - From an infected mother to her child through the placenta
31. The time lag between HIV infection and the appearance of AIDS symptoms is usually:
- 2 to 4 weeks
  - 5 to 10 years
  - 20 to 30 years
  - Less than 6 months in all cases
32. Anti-retroviral drugs used in AIDS:
- Completely cure the patient within a year
  - Are only partially effective and can prolong life but not prevent death
  - Act by destroying helper T-cells
  - Are administered as a preventive vaccine
33. Cancer cells divide in an uncontrolled manner primarily because they lose the property of:
- Metastasis
  - Contact inhibition
  - Differentiation
  - Apoptosis initiation by interferons
34. The most feared property of malignant tumours, in which cells sloughed off travel through the blood and start new tumours at distant sites, is called:
- Neoplasia
  - Contact inhibition
  - Metastasis
  - Transformation
35. Which of the following is a **non-ionising** physical carcinogen?
- X-rays
  - Gamma rays
  - Ultraviolet rays
  - Tobacco smoke
36. Cellular proto-oncogenes, when activated under certain conditions, may lead to the oncogenic transformation of cells. In their normal state these genes are concerned with:
- Regulating normal cell growth and differentiation
  - Producing interferons
  - Coding for antibody heavy chains
  - Coding for reverse transcriptase
37. Which technique for detecting internal cancers uses strong magnetic fields and non-ionising radiations?
- Computed tomography
  - Magnetic resonance imaging
  - Radiography
  - Histopathological study of biopsy
38.  $\alpha$ -interferon is used in cancer therapy because it:

- (a) Directly dissolves the tumour mass
- (b) Blocks the blood supply to the tumour
- (c) Activates the immune system and helps in destroying the tumour
- (d) Converts malignant tumours into benign tumours

**39.** Heroin, commonly called smack, is chemically:

- (a) Diacetylmorphine, obtained by acetylation of morphine
- (b) A cannabinoid obtained from resin
- (c) An alkaloid obtained from *Erythroxylum coca*
- (d) Nicotine obtained from *Nicotiana tabacum*

**40.** Opioid receptors and cannabinoid receptors are principally present in, respectively:

- (a) The brain only; the liver
- (b) The CNS and gastrointestinal tract; the brain
- (c) The gastrointestinal tract; the adrenal gland
- (d) The brain; the CNS and kidney

**41.** Cocaine produces its effect by interfering with the transport of the neurotransmitter:

- (a) Acetylcholine
- (b) Serotonin
- (c) Dopamine
- (d) Nor-adrenaline

**42.** Natural cannabinoids are obtained from which part of *Cannabis sativa*?

- (a) Roots
- (b) Inflorescences
- (c) Seeds only
- (d) Latex of the fruit

**43.** Which pair of plants is specifically mentioned in NCERT for its hallucinogenic properties?

- (a) *Papaver somniferum* and *Cannabis sativa*
- (b) *Atropa belladonna* and *Datura*
- (c) *Erythroxylum coca* and *Nicotiana tabacum*
- (d) *Datura* and *Papaver somniferum*

**44.** Nicotine raises blood pressure and increases heart rate because it stimulates:

- (a) The thyroid gland to release thyroxine
- (b) The adrenal gland to release adrenaline and nor-adrenaline
- (c) The pancreas to release glucagon
- (d) The pituitary to release ADH

**45. Assertion (A):** Smoking causes oxygen deficiency in the body.

**Reason (R):** Smoking increases the carbon monoxide content of blood and reduces the concentration of haem-bound oxygen.

- (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

## Part 4 — Answer key with explanations

| Q  | Ans      | Explanation / the NCERT anchor                                                                                                                                                                                                                                                |
|----|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | <b>a</b> | Filariasis is caused by <i>Wuchereria bancrofti</i> / <i>W. malayi</i> and transmitted by the female <i>Culex</i> mosquito. Malaria needs the <b>female Anopheles</b> ; amoebiasis has no mosquito vector (houseflies are mechanical carriers); ringworm is not vector-borne. |
| 2  | <b>b</b> | Rupture of infected RBCs releases <b>haemozoin</b> , a toxic substance responsible for the chill and high fever recurring every three to four days.                                                                                                                           |
| 3  | <b>c</b> | Sporozoites in mosquito saliva infect humans; gametocytes taken up with the blood meal continue development in the mosquito gut.                                                                                                                                              |
| 4  | <b>d</b> | Typhoid is confirmed by the Widal test.                                                                                                                                                                                                                                       |
| 5  | <b>d</b> | All four statements are directly from NCERT.                                                                                                                                                                                                                                  |
| 6  | <b>d</b> | Pneumonia spreads by inhaling droplets/aerosols released by an infected person, or by sharing glasses and utensils — not through food and water.                                                                                                                              |
| 7  | <b>b</b> | Classic NEET trap: rhino viruses infect the nose and respiratory passage <b>but not the lungs</b> .                                                                                                                                                                           |
| 8  | <b>c</b> | Houseflies are mechanical carriers of <i>Entamoeba histolytica</i> , contaminating food and water.                                                                                                                                                                            |
| 9  | <b>a</b> | This is the exact symptom list NCERT gives for ascariasis. Amoebiasis has mucous and blood clots in the stool instead.                                                                                                                                                        |
| 10 | <b>a</b> | The three ringworm genera. Remember them as "TEM".                                                                                                                                                                                                                            |
| 11 | <b>a</b> | The chronic inflammation of the lymphatic vessels is precisely what produces the gross deformity, so R explains A.                                                                                                                                                            |
| 12 | <b>c</b> | Both are named in the NEET syllabus; the vector is <i>Aedes aegypti</i> .                                                                                                                                                                                                     |
| 13 | <b>a</b> | <i>Ascaris</i> – small intestine; <i>Entamoeba</i> – large intestine; <i>Plasmodium</i> – liver cells then RBCs; <i>Wuchereria</i> – lymphatic vessels.                                                                                                                       |
| 14 | <b>b</b> | Physiological barriers = acid in the stomach, saliva in the mouth, tears from the eyes. Skin and mucus are physical; interferons are cytokine; NK cells are cellular.                                                                                                         |
| 15 | <b>c</b> | Cellular barrier of innate immunity.                                                                                                                                                                                                                                          |
| 16 | <b>a</b> | Virus-infected cells secrete interferons which protect non-infected cells from further viral infection.                                                                                                                                                                       |
| 17 | <b>a</b> | Two light chains and two heavy chains, hence H <sub>2</sub> L <sub>2</sub> .                                                                                                                                                                                                  |
| 18 | <b>b</b> | Colostrum contains abundant <b>IgA</b> ; the foetus receives <b>IgG</b> from the mother through the placenta. Both are passive immunity.                                                                                                                                      |
| 19 | <b>c</b> | Passive immunisation = giving preformed antibodies (antitoxin/antivenom) for a quick response. Vaccines and toxoids give active immunity.                                                                                                                                     |
| 20 | <b>b</b> | Graft rejection is due to cell-mediated immunity — the classic NCERT example of CMI.                                                                                                                                                                                          |
| 21 | <b>b</b> | Bone marrow and thymus, where immature lymphocytes become antigen-sensitive.                                                                                                                                                                                                  |
| 22 | <b>c</b> | The thymus is a <b>primary</b> lymphoid organ. Frequently tested.                                                                                                                                                                                                             |
| 23 | <b>b</b> | Option (a) describes the thymus; (c) describes primary lymphoid organs; (d) describes lymph nodes.                                                                                                                                                                            |
| 24 | <b>c</b> | MALT accounts for about 50% of the lymphoid tissue in the human body.                                                                                                                                                                                                         |
| 25 | <b>a</b> | Allergy involves IgE; mast cells release histamine and serotonin. Treated with anti-histamine, adrenalin and steroids.                                                                                                                                                        |
| 26 | <b>c</b> | Autoimmune disorder — the body attacks self-cells; rheumatoid arthritis is the NCERT example.                                                                                                                                                                                 |
| 27 | <b>a</b> | Retrovirus: RNA genome → viral DNA by reverse transcriptase → integrated into host DNA.                                                                                                                                                                                       |
| 28 | <b>b</b> | The macrophage keeps producing virus and thus acts as an HIV factory; helper T-lymphocytes are attacked simultaneously and progressively decline.                                                                                                                             |
| 29 | <b>c</b> | ELISA (enzyme linked immuno-sorbent assay).                                                                                                                                                                                                                                   |
| 30 | <b>c</b> | HIV is not transmitted by mere touch, hugging or shaking hands — an explicit NCERT statement aimed at reducing stigma.                                                                                                                                                        |
| 31 | <b>b</b> | A few months to many years, usually 5 to 10 years.                                                                                                                                                                                                                            |
| 32 | <b>b</b> | Anti-retroviral drugs are only partially effective: they prolong life but cannot prevent death.                                                                                                                                                                               |
| 33 | <b>b</b> | Loss of contact inhibition allows uncontrolled proliferation into a tumour mass.                                                                                                                                                                                              |
| 34 | <b>c</b> | Metastasis — the most feared property of malignant tumours.                                                                                                                                                                                                                   |
| 35 | <b>c</b> | UV is non-ionising; X-rays and gamma rays are ionising; tobacco smoke is a chemical carcinogen.                                                                                                                                                                               |
| 36 | <b>a</b> | Proto-oncogenes are normal cellular genes regulating growth and differentiation; when activated they become oncogenes.                                                                                                                                                        |
| 37 | <b>b</b> | MRI uses strong magnetic fields and non-ionising radiations; CT uses X-rays.                                                                                                                                                                                                  |
| 38 | <b>c</b> | α-interferon is a biological response modifier that activates the patient's immune system to help destroy the tumour.                                                                                                                                                         |
| 39 | <b>a</b> | Heroin = diacetylmorphine, a white, odourless, bitter crystalline compound obtained by acetylation of morphine, which is extracted from the latex of <i>Papaver somniferum</i> .                                                                                              |
| 40 | <b>b</b> | Opioid receptors: CNS and gastrointestinal tract. Cannabinoid receptors: principally the brain.                                                                                                                                                                               |
| 41 | <b>c</b> | Cocaine interferes with the transport of dopamine; it is a potent CNS stimulant producing euphoria and increased energy.                                                                                                                                                      |
| 42 | <b>b</b> | From the inflorescences — flower tops, leaves and resin.                                                                                                                                                                                                                      |
| 43 | <b>b</b> | <i>Atropa belladonna</i> and <i>Datura</i> are the two plants NCERT names for hallucinogenic properties.                                                                                                                                                                      |
| 44 | <b>b</b> | Nicotine stimulates the adrenal gland to release adrenaline and nor-adrenaline, raising blood pressure and heart rate.                                                                                                                                                        |
| 45 | <b>a</b> | Smoking increases carbon monoxide in blood and lowers haem-bound oxygen, which is exactly the cause of the oxygen deficiency — so R explains A.                                                                                                                               |

## How to read the score

| Score (out of 180) | Correct answers | What to do next                                                                                                       |
|--------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------|
| 170-180            | 43-45           | Chapter is exam-ready. Move to the spaced-revision loop only.                                                         |
| 140-169            | 36-42           | Good base, weak detail. Redo Day 2 and Day 3 of the cycle for the specific blocks that failed.                        |
| 100-139            | 27-35           | Knowledge is patchy. Restart at Day 1 and do the full 7-day cycle properly.                                           |
| Below 100          | Under 27        | Chapter has not been read at NCERT-line level yet. Do the full cycle and do not skip the blank-paper recall on Day 3. |

**The single highest-leverage habit:** after every mistake, write the exact NCERT sentence that contained the answer into a one-page error log. Aamirah should walk into the exam hall having read only that log for this chapter — not the textbook, not these notes.

Content aligned to NCERT Class XII Biology (rationalised edition) and the NTA/NMC NEET syllabus. Verify against the current year's official NTA syllabus PDF before the exam.