

CLASS 12 BIOLOGY – COMPLETE EXAM GUIDE

(Kid-friendly • Colorful mental images • Simple language • High-yield concepts)

CHAPTER 1: HUMAN HEALTH & DISEASE

1. THEORY IN SIMPLE WORDS (WITH VISUALS)

What is Health?

Health = “Body + Mind + Social Well-Being”

Causes of Disease

CAUSES OF DISEASE

| | | |
|-------------|-------------|-----------|
| Pathogens | Lifestyle | Genetics |
| (bacteria, | junk food, | mutations |
| virus etc.) | stress etc. | |

Types of Diseases

1. Infectious Diseases

Caused by pathogens.

Easy mnemonic → **VBBPFH**

(Virus, Bacteria, Protozoa, Prion, Fungi, Helminths)

2. Non-infectious Diseases

- Diabetes
 - Cancer
 - Hypertension
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Malaria – Important for Exam

Organism: *Plasmodium* (vivax, falciparum, malariae, ovale)

Vector: female *Anopheles* mosquito

Life cycle (Easy Diagram)

Human Liver → Human RBC → Mosquito → Human

Symptoms:





Fever with chills (every 2–3 days), anemia.

AIDS

Virus: HIV

Cells destroyed: Helper T-cells (CD4)

Transmission:

-  Blood
-  Sexual contact
-  Mother → baby
-  NOT through touching/sharing food

Prevention Mnemonic: AIDS = AID

- Avoid unprotected sex
 - Ignore shared needles
 - Donate blood safely
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Allergy

When immune system overreacts to harmless substances (pollen, dust).

Symptoms:

Sneezing, rashes, watery eyes.

Test:

ELISA and skin prick test

Immunity – SUPER IMPORTANT!

Two main types:

| IMMUNITY | |
|-----------------------|--|
| INNATE (born with it) | |
| - skin, tears, fever | |

| | |
|----------------------|--|
| | |
| ACQUIRED (developed) | |
| Natural / Artificial | |
| Active / Passive | |

Memory Trick

NAP-AAPA

- N – Natural Active
- A – Artificial Active
- P – Passive Natural
- A – Artificial Passive

Examples:

- Natural active → catching a disease
- Artificial active → vaccines
- Natural passive → mother's milk
- Artificial passive → antibodies injection



Vaccines

Introduce a weakened/killed pathogen → body forms memory cells → immunity.



Drug & Alcohol Abuse (High Yield)

Common drugs:

- Opioids (heroin)
- Cannabinoids
- Cocaine

Effects:

- Liver failure
- Hallucinations
- Addiction

Prevention:

- Proper counseling
- Avoid peer pressure

KEY CONCEPTS, DEFINITIONS & TABLES

Important Table – Pathogen vs Disease

| Pathogen | Disease |
|-----------|---------------------|
| Virus | AIDS, Dengue, Polio |
| Bacteria | TB, Cholera |
| Protozoa | Malaria |
| Fungi | Ringworm |
| Helminths | Ascariasis |

Quick Definitions

| Term | Meaning |
|----------|---|
| Antigen | Substance that triggers immune response |
| Antibody | Protein produced to neutralize antigens |
| Vaccine | Dead/weak pathogen to induce immunity |
| Allergy | Hypersensitive immune reaction |
| Zoonosis | Disease from animals to humans |

SOLVED NUMERICAL PROBLEMS

(There are few numericals in this chapter, mostly *data-based*.)

Q1. A patient's blood test shows CD4 count = 150 cells/mm³. What disease stage does this indicate?

Normal: 500–1500

Below 200 → AIDS

Answer: The patient is in **AIDS stage**.

Q2. Calculate vaccine efficacy:

If 900 out of 1000 vaccinated people do not get the disease → efficacy?

Step:

Efficacy = (Protected / Total) × 100

= (900/1000) × 100 = **90%**

PREVIOUS YEARS' QUESTIONS (WITH SOLUTIONS)

1. Define innate immunity. (Repeated)

Ans: Natural defense present at birth (skin, phagocytes).

2. Name the causative organism of malaria. (Every year)

Ans: *Plasmodium* (falciparum, vivax, malariae, ovale).

3. Difference between active and passive immunity.

(Do table in exam!)

4. Write symptoms of dengue.

Fever, rashes, bleeding, joint pain.

QUICK REVISION NOTES (1 PAGE)

- Health = physical + mental + social
 - Disease types = infectious / non-infectious
 - Malaria vector = female Anopheles
 - AIDS virus = HIV → destroys helper T-cells
 - Immunity types = innate & acquired
 - Vaccines → artificial active immunity
 - Allergy = hypersensitivity
 - Drug abuse dangers = addiction, liver damage
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PREDICTED QUESTIONS

- ✓ Draw immunity chart
- ✓ Compare active vs passive immunity
- ✓ Explain malaria life cycle

- ✓ Write short note on AIDS
 - ✓ Causes of drug abuse
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EXAM TIPS

- Write diagrams! They fetch marks.
 - Malaria/AIDS is repeated every year.
 - Use tables to compare topics → high scoring.
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CHAPTER 2: STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION

THEORY IN SIMPLE WORDS

Plant Breeding (Very Important)

Goal = improve crop quality & yield.

Steps (Mnemonic: ICSHR)

1. **I** – Collection of variability
 2. **C** – Cross breeding
 3. **S** – Selection
 4. **H** – Hybridisation
 5. **R** – Release of improved variety
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Single Cell Protein (SCP)

Protein from microbes → used as food.

Example:

- **Spirulina** (algae) → superfood
 - **Yeast** → bakery
 - **Fusarium** → mycoprotein
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Tissue Culture

Growing plant cells in lab.

Flowchart:

Explant → Sterilization → Nutrient Medium → Callus → Plantlet

Micropropagation

Fast multiplication of disease-free plants.

★ Animal Husbandry

Includes management of:

- 🐄 Dairy (cows)
 - 🐔 Poultry
 - 🐑 Sheep
 - 🐟 Fish (Aquaculture)
-

🌟 KEY TABLES

Types of Breeding

| Type | Meaning | Example |
|---------------|-------------------|-----------------|
| Inbreeding | Same breed mating | Jersey cow |
| Outbreeding | Different breeds | Cross-bred cows |
| Hybridisation | Superior hybrids | Heterosis |

🌟 SOLVED NUMERICALS

Q1. If hybrid crop yields increased from 40 to 56 tonnes, find % increase.

$$\text{Increase} = 56 - 40 = 16$$

$$\% \text{ increase} = (16/40) \times 100 = 40\%$$

Q2. In tissue culture, 1 explant → 4 plantlets. In next round each makes 4 more. Total?

$$\text{First round} = 4$$

$$\text{Second round} = 4 \times 4 = 16$$

$$\text{Total} = 20 \text{ plantlets}$$

PYQs

- Define tissue culture.
 - State heterosis.
 - Advantages of micropropagation.
 - What is SCP?
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QUICK REVISION NOTES

- Steps of plant breeding = ICSHR
 - SCP examples: Spirulina, yeast
 - Tissue culture → micropropagation
 - Inbreeding increases homozygosity
 - Outcrossing prevents inbreeding depression
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PREDICTED QUESTIONS

- ✓ Steps of tissue culture
 - ✓ Hybrid vigour
 - ✓ Single cell protein
 - ✓ Inbreeding depression
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EXAM TIPS

- Draw tissue culture steps!
 - Keep definitions short and crisp.
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CHAPTER 3: MICROBES IN HUMAN WELFARE

THEORY IN SIMPLE WORDS

Microbes are HELPERS!

They help in:

- Food (curd, bread, cheese)
 - Medicine (antibiotics)
 - Industry (fermentation)
 - Agriculture (biofertilizers)
 - Environment (sewage treatment)
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★ Microbes in Food

Lactobacillus → Curd

Yeast → Bread, beer

Mushrooms → Edible fungi

★ Antibiotics

Penicillin from *Penicillium notatum*

Discovered by Alexander Fleming.

★ Microbes in Sewage Treatment

Primary treatment → removes solids

Secondary → microbes digest organic matter

Tertiary → chlorine/UV

★ Biofertilizers

Rhizobium → Nitrogen fixation in legumes

Cyanobacteria → paddy fields

Mycorrhiza → nutrient absorption

🌟 KEY TABLES

Microbe – Product – Application

| Microbe | Product | Use |
|---------------|-------------|---------|
| Lactobacillus | Lactic acid | Curd |
| Yeast | Ethanol | Alcohol |

| Microbe | Product | Use |
|-------------|------------|----------------|
| Penicillium | Penicillin | Antibiotic |
| Rhizobium | Nitrogen | Soil fertility |

SOLVED NUMERICALS

Q1. If BOD decreases from 200 mg/L to 80 mg/L after treatment, % decrease?

Decrease = 120

% decrease = $(120/200) \times 100 = 60\%$

Q2. 1 liter fermenter yields 10g penicillin. How much from 500 L?

= $10 \times 500 = 5000 \text{ g}$

PYQs

- What is BOD?
- Name biofertilizers.
- Write uses of Lactobacillus.
- What is activated sludge?

QUICK REVISION NOTES

- Curd → Lactobacillus
- Antibiotic → Penicillin
- Sewage treatment → BOD ↓
- Biofertilizers → Rhizobium, blue-green algae
- Fermenters used for industrial production

PREDICTED QUESTIONS

- ✓ Define BOD
 - ✓ Role of microbes in food
 - ✓ Biofertilizers classification
 - ✓ Antibiotics examples
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EXAM TIPS

- Always define → microbe + product + application
 - Mention Fleming for penicillin
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FINAL ULTRA-QUICK REVISION PAGE (FOR NIGHT BEFORE EXAM)

HUMAN HEALTH & DISEASE

- Malaria = Plasmodium (mosquito)
 - AIDS = HIV destroys CD4 cells
 - Immunity = innate & acquired
 - Active vs passive immunity table important
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FOOD PRODUCTION

- Plant breeding steps = ICSHR
 - SCP = Spirulina
 - Tissue culture → micropropagation
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MICROBES IN WELFARE

- Curd = Lactobacillus
- Bread = Yeast
- Penicillin = Penicillium
- Biofertilizers = Rhizobium, BGA