Biology Suggestion

- **Use the provided suggestion as your main framework.**
- **Thoroughly study the concepts covered in the suggestion.**
- **Solve the previous 3 years' question papers along with this suggestion.**

Introduction to Biology

- What is **Biomimicry** and its applications?
- Explain the concept of **Biomimicry** with an example.
- What are the different **branches of biology** like Zoology, Botany, Genetics, etc.?
- Why is Biology important as a scientific discipline to Mathematics, Physics and Chemistry?
- What is meant by the term **osmoregulation**?

Biological Classification

- Explain the importance of **biological classification**.
- What are the different **categories of taxonomy**?
- Define **cell** and how it is classified based on ultrastructure.
- Differentiate between **prokaryotic and eukaryotic cells**.
- Describe the **fluid mosaic model** of plasma membrane.
- What are **model organisms**? Give examples. (Questions about specific model organisms like *E. coli*, *C. elegans*, *M. musculus* appeared in 2023).
- Describe characteristic features of **Kingdoms** (Monera, Protista, Fungi, Virus).
- What are the **living/non-living features of viruses**? (Asked in 2024).

Biomolecules & Macromolecules

- What are **biomolecules**?
- Write a note on **carbohydrate, protein, lipid, polynucleotides**.
- Classify **monosaccharides** based on carbon number or carbonyl group.
- Significance of mono/oligo/poly saccharides, including **sucrose, cellulose, starch, lactose**.
- What are **amino acids**? How many essential amino acids are there?
- Explain the **structure of amino acid** and **polypeptide bond formation**.
- Write a note on **protein structure** (structural/functional, 3D, secondary structures like α helix/β pleated sheet).
- What are **fatty acids**? Mention types like PUFA and MUFA.
- Describe the biological functions and **significance of lipids** (triglycerides, phospholipids, steroids).
- What are **nucleotides/nucleosides**? How to identify them?
- Describe the **Watson and Crick DNA model**.

Microbiology

- What are **growing media**? Name some types. (Fluid Thioglycollate medium was asked in 2024).
- Write a note on **bacterial cell wall** (Gram positive/negative).
- Write a note on bacterial structures: **plasmid DNA, endospore, capsule, flagella, pili**.
- Explain the concept of a **microbial growth curve**. (Bacterial population growth follows geometric progression was asked in 2024).

- How can microbes be controlled by **altering growing conditions**?
- What are **antibiotics**?
- What do you mean by **disinfectant, antiseptic, sterilization**?
- Classify bacteria based on **oxygen requirement, pH, temperature**.

Information Transfer

- What is the **central dogma of life**?
- What do you mean by **replication**? Explain the process with a diagram. (Process of transfer of hereditary character was asked in 2023).
- Explain the **semi-conservative method of DNA replication**.
- What is **transcription** and **translation**? (Enzyme transcribing hnRNA in eukaryotes was asked in 2023).
- What are **genetic codes** and their unique properties? (Characteristics of genetic code were asked in 2024).
- What is a **genetic material**? Why is **DNA considered as a genetic material**?
- What is **complementing base pairing**?
- What are **histone proteins** and their importance?
- Describe the **hierarchy of DNA structure** from single strand to nucleosomes.

Enzymes

- What are **enzymes**? What are they made of? (Definition with example asked in 2023).
- Explain the significance of an **active site** and how it functions.

- What are **inhibitors**? Explain different types of inhibitors with diagrams. (Competitive, uncompetitive, non-competitive inhibitors effect on km and vmax was asked in 2023).
- What are the **characteristics of enzymes**? (Enzyme lowering activation energy was asked in 2024).
- Explain the **mechanism of enzyme action** via Lock & Key / Induced Fit model. (Enzyme-substrate complex formation and steps was asked in 2023).
- How does **temperature, pH, and substrate concentration affect enzymatic activity**?
- Explain the significance of the **Michaelis-Menten model**.

Metabolism

- What do you mean by **metabolism** and its types?
- What is **ATP**? Why is it considered the **energy currency**?
- What is **glycolysis**? Explain it with a diagram. (Asked in 2024).
- What is **Kreb's cycle/TCA cycle**? (Asked in 2024).
- What is **ETS**?
- What is **photosynthesis**? Give an overview with a diagram.
- Explain **light reaction** and **dark reaction**.
- What is **photolysis**?

Genetics

- What is **cell division**? Differentiate between **Mitosis and Meiosis**.

- Define **genes, alleles, homozygous/heterozygous, dominant/recessive alleles**.
- What is a **Punnett Square**?
- What are **monohybrid and dihybrid cross**? (A dihybrid cross problem was asked in 2024). Practice problems involving F2 generation ratios.
- Explain **Mendel's Laws of inheritance** (Dominance, Independent Assortment, Segregation) with examples. (Linkage as an exception was asked in 2023).
- What is **Epistasis**? Give an example. (Asked in 2023).
- Describe characteristics of **chromosomal disorders** like Trisomy 21, XXY, XO. (Asked in 2024).
- What is a sudden change in the gene which is heritable from one generation to other? (Mutation).