

# Final Term Preparation File: Basic Biology (BIO 101)

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## Lectures 66 to 130

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## Quranic Motivation (Roman English)

*“Insaan ke liye wahi kuch hota hai jis ke liye woh khud mehnat aur koshish karta hai.”*

*Reference: Surah An-Najm, Ayah 39*

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## File Introduction

This preparation file is strictly designed for the **Final Term syllabus only**, covering **Lessons 66 to 130** of Basic Biology (BIO 101). The content is based 100% on the official LMS handouts to ensure accuracy and alignment with the Virtual University (VU) examination pattern.

### Key Features of this File:

- **Deep Conceptual Explanation:** Every lesson is explained in detail to ensure a deep understanding rather than rote memorization.
- **Simple English:** Definitions and explanations are provided in very simple, easy-to-understand English, assuming the student is a beginner.
- **Daily Life Examples:** Every topic includes a mandatory daily life example to make the concepts relatable and easy to grasp.
- **Conceptual Focus:** VU exams are conceptual. This file focuses on the “why” and “how” of biological processes to help you achieve a **4.0 CGPA**.

- **Supportive Material:** This file is intended to support your learning. Students **must read the official LMS handouts at least three times** for the best results. This file supports the handouts but does not replace them.
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**In the name of Allah.**

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## **LESSON NO. 66: Virus Name and Introduction**

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**Author: ZB ZAIB**

### **1. What is a Virus?**

The word “virus” comes from a Latin word that means “**slimy liquid**” or “**poison.**” Viruses are tiny, microscopic parasites. They are so small that they cannot be seen with a regular microscope.

**Deep Understanding:** A virus is like a “hitchhiker.” It cannot live or grow on its own. It needs a “host” (like a human, animal, or plant cell) to survive and reproduce. Without a host, it is just a piece of genetic material wrapped in protein.

**Example:** Think of a virus like a **computer virus on a USB drive**. The USB drive itself cannot do anything. But as soon as you plug it into a computer (the host), the virus starts working and making copies of itself using the computer’s system.

### **2. Characteristics of Viruses**

- **Submicroscopic:** They are much smaller than bacteria.
- **Obligate Intracellular Parasites:** This means they *must* be inside a living cell to “live” and multiply.
- **Simple Structure:** They consist of a small piece of nucleic acid (DNA or RNA) inside a protein shell.

**Example:** Imagine a **locked house** (the host cell). The virus is like a **burglar** who doesn’t have his own tools. He enters the house and uses the owner’s kitchen and stove (the cell’s machinery) to cook his own food (make new viruses).

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# LESSON NO. 67: Importance of Virology and Virus Life Cycle

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Author: ZB ZAIB

## 1. Why Study Virology?

Virology is the study of viruses. It is important because viruses cause many diseases like the common cold, AIDS, and smallpox.

**Deep Understanding:** Viruses are unique because they show characteristics of both **living and non-living** things. When they are outside a cell, they are like non-living dust. When they enter a cell, they start acting like living things.

**Example:** Think of a **seed**. If you keep a seed in a dry box, it looks like a non-living stone. But when you put it in soil and give it water (the right environment), it starts to grow. Similarly, a virus “wakes up” only when it finds a host cell.

## 2. The Virus Life Cycle

The process of a virus making copies of itself involves four main steps:

1. **Disassembly:** The virus breaks open after entering the host cell.
2. **Replication:** The virus’s genetic material is copied.
3. **Synthesis:** The host cell is forced to make viral proteins.
4. **Reassembly:** The new parts are put together to make new viruses.

**Example:** Imagine a **factory** that makes cars. A virus is like a **fake manager** who enters the factory, stops the production of regular cars, and tells the workers to use the factory’s machines to build his own specific type of bike instead.

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# LESSON NO. 68: General Properties of Virus

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Author: ZB ZAIB

## 1. Virus Size and Structure

Viruses are extremely small, ranging from **20 to 300 nanometers**. To understand how small they are, if a virus were the size of three soccer balls, a bacterium would be the size of an entire soccer field!

**Deep Understanding:** An individual virus particle is called a **virion**. It lacks a cell membrane, cytoplasm, and ribosomes. This is why it cannot make its own proteins.

**Example:** Think of a **recipe card** (the virus). A recipe card has all the instructions to make a cake, but the card itself cannot bake the cake. It needs a **kitchen** (the host cell) with an oven and ingredients to actually make the cake.

## 2. Simple vs. Complex Viruses

- **Simple Viruses:** Only have a protein coat (capsid) and genetic material (DNA or RNA).
- **Complex Viruses:** May also contain lipids (fats) and carbohydrates (sugars).

**Example:** A **simple virus** is like a **letter in an envelope**. The letter is the DNA/RNA, and the envelope is the protein coat. A **complex virus** is like a **parcel** that has the envelope but is also wrapped in extra bubble wrap (lipids) for more protection.

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# LESSON NO. 69: Morphology and Structure of Viruses

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**Author: ZB ZAIB**

## 1. Enveloped vs. Non-Enveloped Viruses

- **Non-Enveloped (Naked) Viruses:** These consist only of a protein shell (capsid) and nucleic acid.
- **Enveloped Viruses:** These have an extra outer layer called an “envelope” made of lipids (fats).

**Deep Understanding:** The envelope often helps the virus “disguise” itself from the host’s immune system, but it also makes the virus more sensitive to heat and detergents (like soap).

**Example:** A **naked virus** is like a person wearing just a **shirt** (the protein coat). An **enveloped virus** is like a person wearing a shirt and then putting on a **heavy raincoat** (the envelope) over it for extra protection.

## 2. Shapes of Viruses (Morphology)

- **Helical:** Coiled like a ribbon (e.g., Rabies virus).
- **Polyhedral:** Many-sided, like a diamond (e.g., Influenza virus).
- **Complex:** Unusual shapes that don't fit the other two (e.g., Poxvirus).

**Example:** Think of **gift wrapping**. You can wrap a gift in a **tube shape** (helical), a **box shape** (polyhedral), or a **fancy irregular shape** (complex).

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# LESSON NO. 70: Bacteriophages

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**Author:** ZB ZAIB

## 1. What is a Bacteriophage?

A bacteriophage (or “phage”) is a special type of virus that **infects only bacteria**. Even tiny bacteria can get “sick” from viruses!

**Deep Understanding:** Phages are very important in science because they help us understand how viruses work. They have a unique “head-tail” structure that looks like a tiny lunar lander.

**Example:** Think of a **mosquito** biting a human. Just like a mosquito targets humans to get blood, a **bacteriophage** targets bacteria to reproduce.

## 2. The Two Life Cycles of Phages

1. **Lytic Cycle:** The phage enters the bacterium, makes copies, and then **bursts** the bacterium open (killing it) to release new phages.
2. **Lysogenic Cycle:** The phage hides its DNA inside the bacterium's DNA. It doesn't kill the bacterium immediately; instead, it gets copied every time the bacterium divides.

**Example:** The **Lytic Cycle** is like a **robber** who enters a house, steals everything, and then blows up the house. The **Lysogenic Cycle** is like a **spy** who moves into a house and lives there quietly for years without anyone knowing.

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## LESSON NO. 71: Bacteriophages Properties

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**Author:** ZB ZAIB

### 1. Virus Architecture

A virus particle is called a **virion**. It consists of nucleic acid (the brain/instructions) surrounded by a protein coat called a **capsid**.

**Deep Understanding:** The capsid is made of smaller units. Its main job is to protect the fragile genetic material inside from being destroyed by the environment.

**Example:** Think of a **precious pearl** inside a **hard shell**. The pearl is the nucleic acid (DNA/RNA), and the shell is the capsid. The shell ensures the pearl stays safe until it reaches its destination.

### 2. Types of Virions

- **Naked:** No extra covering.
- **Enveloped:** Surrounded by a lipid (fatty) membrane.

**Example:** A **naked virion** is like a **hard-boiled egg** (just the egg). An **enveloped virion** is like a **chocolate-covered candy** where the chocolate is the extra outer layer (envelope).

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## LESSON NO. 72: Microbes and Microbiology

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**Author:** ZB ZAIB

## 1. What are Microbes?

Microbes (or microorganisms) are tiny living things that are too small to be seen with the naked eye. We need a **microscope** to see them. They are everywhere: in the air, water, soil, and even inside our bodies.

**Deep Understanding:** Not all microbes are bad. Some make us sick (germs), but many are helpful for our health and the environment (like the bacteria that help us digest food).

**Example:** Think of **dust motes** in a beam of sunlight. You can't usually see them, but they are always floating in the air. Microbes are similar—they are always there, even if you can't see them.

## 2. Prokaryotic vs. Eukaryotic Cells

- **Prokaryotes:** Simple cells with **no nucleus** (e.g., Bacteria).
- **Eukaryotes:** Complex cells with a **defined nucleus** (e.g., Human cells, Plants, Fungi).

**Example:** A **Prokaryotic cell** is like a **studio apartment** where everything (kitchen, bed, desk) is in one open room. A **Eukaryotic cell** is like a **large house** with separate rooms for the kitchen, bedroom, and office (the organelles).

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# LESSON NO. 73: Classification of Microbes

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**Author: ZB ZAIB**

## 1. The Five Kingdom System

Robert Whittaker proposed that all living things be divided into five kingdoms:

1. **Monera:** Bacteria (Prokaryotes).
2. **Protista:** Simple eukaryotes (like Amoeba).
3. **Fungi:** Yeasts and Mushrooms.
4. **Plantae:** Plants.

## 5. **Animalia:** Animals.

**Deep Understanding:** Classification helps scientists organize millions of different organisms so they can study them easily. It's like a library where books are arranged by category.

**Example:** Think of a **supermarket**. If all the items (milk, soap, bread, fruit) were thrown in one big pile, you could never find anything. The supermarket uses "classification" by putting dairy in one aisle and fruits in another so you can find them easily.

## 2. Binomial Nomenclature (Naming Organisms)

Every organism has a two-part scientific name: the **Genus** (capitalized) and the **Specific Epithet** (lowercase). For example, *Homo sapiens* (Humans).

**Example:** This is just like your **First Name and Last Name**. Your first name (Genus) tells people which family you belong to, and your last name (Specific Epithet) identifies you specifically within that family.

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# LESSON NO. 74: Microscopy

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**Author: ZB ZAIB**

## 1. What is a Microscope?

A microscope is a tool that makes tiny objects look larger. The human eye can only see things larger than 0.2 mm. Anything smaller requires a microscope.

**Deep Understanding:** **Antonie Van Leeuwenhoek** is known as the "Father of Microbiology" because he was the first to invent and use a microscope to see tiny "animalcules" (microbes).

**Example:** Think of a **magnifying glass**. If you look at a tiny ant with a magnifying glass, it looks like a giant monster. A microscope is just a much more powerful version of that magnifying glass.

## 2. Parts of a Compound Microscope

- **Eyepiece:** The lens you look through (usually 10x).
- **Objective Lenses:** Lenses near the object (4x, 10x, 40x, 100x).
- **Stage:** Where you place the slide.

**Example:** Using a microscope is like using **binoculars**. You have to adjust the focus knobs to see the bird clearly, just like you adjust the “fine adjustment knob” on a microscope to see a cell clearly.

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## LESSON NO. 78: Digestive System and Nutrition

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**Author: ZB ZAIB**

### 1. Modes of Nutrition

Animals get energy by eating different things:

- **Herbivores:** Eat only plants (e.g., Goat).
- **Carnivores:** Eat only meat (e.g., Lion).
- **Omnivores:** Eat both plants and meat (e.g., Humans, Bears).
- **Detritivores:** Eat dead organic matter (e.g., Earthworms).

**Deep Understanding:** An animal’s body, especially its teeth and digestive system, is specially designed for what it eats.

**Example:** Think of **different types of fuel**. A car needs petrol, a truck needs diesel, and a stove needs gas. Just like that, different animals need different “fuels” (foods) to run their bodies.

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## LESSON NO. 79: Steps of Nutrition

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**Author: ZB ZAIB**

## 1. The Five Steps of Nutrition

1. **Ingestion:** Taking food into the mouth.
2. **Digestion:** Breaking down big food into tiny pieces (e.g., starch to glucose).
3. **Absorption:** Moving the tiny food pieces into the blood.
4. **Assimilation:** Using the food to get energy or build the body.
5. **Elimination:** Removing undigested waste from the body.

**Deep Understanding:** Digestion is like a “deconstruction” process. Your body cannot use a whole piece of bread; it must break it down into tiny sugar molecules first.

**Example:** Imagine you buy a **Lego castle**. **Ingestion** is bringing the box home. **Digestion** is taking the castle apart into individual bricks. **Absorption** is putting those bricks into your toy box. **Assimilation** is using those bricks to build a new Lego car.

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## LESSON NO. 80: Human Digestive System

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**Author:** ZB ZAIB

### 1. Parts of the Alimentary Canal

The alimentary canal is a long tube from the mouth to the anus.

- **Oral Cavity (Mouth):** Where food is chewed and mixed with saliva.
- **Esophagus:** A tube that carries food to the stomach using “peristalsis” (wave-like movements).
- **Stomach:** A bag that stores food and uses acid to digest proteins.

**Deep Understanding:** The stomach has a special lining of **mucus** to protect itself from its own acid. Without this mucus, the acid would burn the stomach itself!

**Example:** Think of the **Esophagus** like a **tube of toothpaste**. To get the toothpaste out, you squeeze it from the bottom up. Peristalsis is like your muscles “squeezing” the food down to your stomach.

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# LESSON NO. 81: Small Intestine

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Author: ZB ZAIB

## 1. Structure and Function

The small intestine is where most of the digestion and absorption happens. It has three parts: **Duodenum, Jejunum, and Ileum.**

**Deep Understanding:** The inside of the small intestine is not smooth. It has tiny finger-like structures called **Villi**. These villi increase the surface area so the body can absorb more nutrients quickly.

**Example:** Think of a **towel**. A flat piece of plastic doesn't soak up much water, but a towel has thousands of tiny loops (like villi) that soak up water very fast. The small intestine uses villi just like a towel uses loops!

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# LESSON NO. 82: Large Intestine

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Author: ZB ZAIB

## 1. Function of the Large Intestine

The main job of the large intestine is to **absorb water** from the undigested food and turn it into solid waste (feces).

**Deep Understanding:** If the large intestine works too fast, it doesn't absorb enough water, leading to **diarrhea**. If it works too slow, it absorbs too much water, leading to **constipation**.

**Example:** Think of a **sponge** squeezing water out of a wet cloth. The large intestine is like that sponge—it takes back the water your body needs before the waste is thrown away.

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# LESSON NO. 100: Introduction to Ecology

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Author: ZB ZAIB

## 1. What is Ecology?

Ecology is the study of how living things (animals, plants) interact with each other and their non-living environment (air, water, soil).

**Deep Understanding:** In ecology, we look at different levels:

- **Population:** A group of the same animals (e.g., all the frogs in a pond).
- **Community:** Different animals living together (e.g., frogs, fish, and plants in a pond).
- **Ecosystem:** The community plus the non-living things (e.g., the pond water and sunlight).

**Example:** Think of a **school**. A single student is an individual. A class of students is a **population**. All the students, teachers, and staff together are a **community**. The school building, the books, and the people together make an **ecosystem**.

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# LESSON NO. 101: Factors Affecting the Environment

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Author: ZB ZAIB

## 1. Human Interference

Humans change the environment in many ways, often causing harm:

- **Deforestation:** Cutting down forests for wood or buildings.
- **Urban Spread:** Building more cities, which destroys animal homes.
- **Pollution:** Industrial waste poisoning the water and air.

**Deep Understanding:** Everything in nature is connected. If we cut down trees, birds lose their homes. If birds decrease, the insects they used to eat will increase and destroy our crops.

**Example:** Imagine a **Jenga tower**. If you pull out one block (like cutting down a forest), the whole tower becomes shaky and might eventually fall down.

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## LESSON NO. 102: Ecosystem Components

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**Author:** ZB ZAIB

### 1. Biotic and Abiotic Factors

- **Biotic Factors:** All living things (Plants, Animals, Bacteria).
- **Abiotic Factors:** All non-living things (Sunlight, Water, Temperature, Soil).

**Deep Understanding:** Living things cannot survive without non-living things. For example, plants (biotic) need sunlight (abiotic) to make food.

**Example:** Think of a **fish tank**. The fish and the plants are **biotic**. The water, the heater, the filter, and the light are **abiotic**. You need both to keep the fish alive!

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## LESSON NO. 103: Ecological Pyramids

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**Author:** ZB ZAIB

### 1. Trophic Levels

Energy moves through an ecosystem in a specific order:

1. **Producers:** Plants (they make energy from sunlight).
2. **Consumers:** Animals (they eat plants or other animals).
3. **Decomposers:** Fungi and Bacteria (they break down dead things).

**Deep Understanding:** Energy always starts with the **Sun**. Plants capture this energy, and then it is passed on to animals when they eat the plants.

**Example:** Think of a **battery-powered toy**. The **Sun** is the battery charger. The **Plants** are the batteries that store the energy. The **Animals** are the toys that use the energy from the batteries to move.

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## LESSON NO. 104: Aquatic Ecosystems

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**Author:** ZB ZAIB

### 1. Life in Water

Aquatic ecosystems include fresh water (lakes, rivers) and marine water (oceans).

**Deep Understanding:** Water is a great place for life because it changes temperature very slowly. This keeps the environment stable for the animals living inside.

**Example:** Think of a **swimming pool** on a hot day. Even if the air is very hot, the water stays nice and cool. This is why fish can survive even when the weather outside changes quickly.

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## LESSON NO. 121: Importance of Vertebrates

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**Author:** ZB ZAIB

### 1. Benefits and Harms of Vertebrates

Vertebrates (animals with backbones) are very important to humans:

- **Benefits:** They provide food (meat, milk, eggs), materials (wool, leather), and even medicine (snake venom).
- **Harms:** Some are poisonous (snakes), some are parasites (worms), and some are pests (rats).

**Deep Understanding:** Vertebrates are the most complex animals on Earth. They play a key role in the “food web,” keeping the balance of nature.

**Example:** Think of **Honeybees**. Even though they can sting you (harm), they are essential because they make honey and help flowers grow (benefit).

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# LESSON NO. 122: Introduction to Reproduction

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Author: ZB ZAIB

## 1. Types of Reproduction

Reproduction is how living things make “young ones” like themselves.

- **Asexual Reproduction:** Only one parent is involved. The children are exactly like the parent (e.g., Bacteria).
- **Sexual Reproduction:** Two parents are involved. The children are a mix of both parents (e.g., Humans).

**Deep Understanding:** Sexual reproduction is better for survival because it creates **variety**. If every animal was exactly the same, one single disease could kill all of them!

**Example:** **Asexual reproduction** is like making a **photocopy** of a paper. **Sexual reproduction** is like **mixing red and blue paint** to get a new color (purple).

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# LESSON NO. 123: Methods of Asexual Reproduction

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Author: ZB ZAIB

## 1. Common Methods

- **Binary Fission:** One cell splits into two (e.g., Bacteria).
- **Budding:** A small “bud” grows on the parent and then falls off to become a new individual (e.g., Yeast).
- **Regeneration:** If a part of the body is cut off, it grows into a new animal (e.g., Starfish).

**Example:** **Regeneration** is like a **magic trick**. If you cut off a lizard’s tail, it grows a new one. In some animals like starfish, that cut-off tail can even grow into a whole new starfish!

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# LESSON NO. 124: Sexual Reproduction in Plants

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Author: ZB ZAIB

## 1. Flowers and Seeds

Plants use flowers to reproduce. The male part (stamen) produces **pollen**, which must reach the female part (carpel) through a process called **pollination**.

**Deep Understanding:** After fertilization, the “ovary” of the flower turns into a **fruit**, and the “ovules” inside turn into **seeds**.

**Example:** Think of a **Mango tree**. The beautiful flowers you see in spring are the “reproductive organs.” Those flowers eventually turn into the delicious mango fruit that contains the seed for a new tree.

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# LESSON NO. 125: Human Reproductive System

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Author: ZB ZAIB

## 1. Male and Female Systems

- **Males:** Produce **sperms** in the testes.
- **Females:** Produce **ova (eggs)** in the ovaries.

**Deep Understanding:** The gender of a baby is determined by the father’s sperm. If the sperm carries an **X** chromosome, it’s a girl. If it carries a **Y** chromosome, it’s a boy.

**Example:** Think of a **lock and key**. The egg is like the lock, and the sperm is like the key. When they meet and join together, they “unlock” the process of growing a new baby.

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# LESSON NO. 126: Biotechnology

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Author: ZB ZAIB

## 1. What is Biotechnology?

Biotechnology is using living organisms (like bacteria or yeast) to make useful products for humans, such as medicines or better food.

**Deep Understanding: Genetic Engineering** is a part of biotechnology where we take a “good gene” from one animal and put it into another to give it a new “superpower.”

**Example:** Think of **baking bread**. We use **yeast** (a living fungus) to make the dough rise. This is one of the oldest forms of biotechnology!

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## LESSON NO. 127: Transgenic Organisms

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Author: ZB ZAIB

### 1. Useful Bacteria and Plants

- **Transgenic Bacteria:** Used to make **Insulin** for diabetic patients.
- **Transgenic Plants:** Crops that are resistant to pests or viruses (e.g., BT Cotton).

**Deep Understanding:** Before any genetically modified food is sold, it must pass **Biosafety** tests to make sure it is safe for humans to eat.

**Example:** Imagine a **tomato** that has a gene from a fish that lives in cold water. This gene helps the tomato survive in the winter without freezing. This is a “transgenic” plant.

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## LESSON NO. 128: Animal Cultures

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Author: ZB ZAIB

### 1. Types of Cultures

- **Aquaculture:** Raising fish or prawns in water.
- **Sericulture:** Raising silkworms to make silk.
- **Apiculture:** Keeping honeybees for honey.

**Example: Sericulture** is like a **silk factory** where the “workers” are tiny worms. They eat mulberry leaves and spin silk threads that we use to make expensive clothes.

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## LESSON NO. 129: Dairy, Poultry, and Pest Control

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Author: ZB ZAIB

### 1. Biological Pest Control

Instead of using poisonous chemicals (pesticides), we use “natural enemies” to kill pests.

**Deep Understanding:** This is the best method because it doesn’t pollute the environment and the pests cannot become “immune” to being eaten!

**Example:** If you have too many **rats** in a warehouse, instead of using poison, you bring in a **cat**. The cat is a “biological control agent” that solves the problem naturally.

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## LESSON NO. 130: Science, Ethics, and Values

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Author: ZB ZAIB

### 1. Science and Society

Science is the investigation of the universe. However, science must follow **Ethics** (rules about what is right and wrong).

**Deep Understanding:** Just because we *can* do something with science (like cloning a human) doesn’t mean we *should* do it. We must respect the values of our society.

**Example:** Think of a **knife**. Science gave us the knowledge to make a knife. **Ethics** tells us that a knife should be used by a doctor to save a life in surgery, not to hurt someone.

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# SECTION: CONCEPTUAL QUESTIONS & LESSON QUIZZES

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Author: ZB ZAIB

## Lesson 66-71: Virology Quiz

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### 1. Why are viruses called “obligate intracellular parasites”?

- **Answer:** Because they cannot reproduce or survive outside a host cell. They are “obliged” (forced) to stay “intracellular” (inside the cell).
- **Example:** Like a mobile phone that only works when it is connected to a charger. Without the charger (host), the phone (virus) is useless.

### 2. What is the difference between the Lytic and Lysogenic cycles?

- **Answer:** In the Lytic cycle, the virus kills the host cell immediately. In the Lysogenic cycle, the virus hides inside the host’s DNA and stays quiet.
- **Example:** Lytic is like a fire that burns a house down instantly. Lysogenic is like a termite that slowly eats the wood of a house from the inside for years.

### MCQs:

1. The word virus means: (A) Life (B) **Poison** © Cell (D) Water
  2. A virus that infects bacteria is called: (A) Virion (B) **Bacteriophage** © Prion (D) Viroid
  3. The protein coat of a virus is called: (A) Envelope (B) **Capsid** © Nucleus (D) Cell wall
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## Lesson 72-74: Microbiology & Microscopy Quiz

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### 1. Why is Antonie Van Leeuwenhoek called the Father of Microbiology?

- **Answer:** Because he was the first person to see and describe tiny microbes using a microscope he built himself.
- **Example:** Like the first person who used a telescope to see that the moon has craters. He opened a whole new world for us.

## 2. What is the difference between Prokaryotes and Eukaryotes?

- **Answer:** Prokaryotes have no nucleus (simple), while Eukaryotes have a proper nucleus (complex).
- **Example:** A prokaryote is like a simple bicycle, and a eukaryote is like a complex car with an engine and air conditioning.

### MCQs:

1. Which kingdom includes bacteria? (A) Fungi (B) **Monera** © Protista (D) Animalia
  2. The resolving power of the human eye is: (A) 1mm (B) **0.2mm** © 10um (D) 5mm
  3. Scientific names are written in: (A) English (B) **Latin** © Urdu (D) Arabic
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## Lesson 78-82: Digestive System Quiz

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### 1. What is “Peristalsis”?

- **Answer:** It is the wave-like muscular contraction that pushes food down the esophagus to the stomach.
- **Example:** Like squeezing a tube of glue from the bottom to push the glue out of the top.

### 2. Why does the small intestine have Villi?

- **Answer:** To increase the surface area so that more nutrients can be absorbed into the blood quickly.
- **Example:** Like using a large sponge instead of a small one to soak up a big spill of water.

### MCQs:

1. Humans are: (A) Herbivores (B) Carnivores © **Omnivores** (D) Detritivores

2. Which organ absorbs most of the water? (A) Stomach (B) **Large Intestine** © Mouth (D) Liver
  3. Bile is produced by the: (A) Pancreas (B) **Liver** © Stomach (D) Small Intestine
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## Lesson 100-104: Ecology Quiz

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### 1. What is the difference between a Community and an Ecosystem?

- **Answer:** A community is just the living things. An ecosystem is the living things PLUS the non-living environment (like water and air).
- **Example:** A community is the people in a house. An ecosystem is the people PLUS the house, the furniture, and the electricity.

### 2. Why are plants called “Producers”?

- **Answer:** Because they produce their own food using sunlight. They don’t need to eat other things.
- **Example:** Like a solar panel that makes its own electricity from the sun.

### MCQs:

1. The main source of energy in an ecosystem is: (A) Plants (B) **Sunlight** © Water (D) Soil
  2. Cutting down forests is called: (A) Agriculture (B) **Deforestation** © Urbanization (D) Ecology
  3. Which is an abiotic factor? (A) Bacteria (B) **Temperature** © Birds (D) Fungi
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## Lesson 121-130: Reproduction & Biotech Quiz

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### 1. What is the advantage of Sexual Reproduction?

- **Answer:** It creates genetic variety, which helps species adapt to changing environments.
- **Example:** If you have many different types of keys, you are more likely to find one that opens a new lock.

## 2. What is a “Transgenic” organism?

- **Answer:** An organism that has a gene from another species inserted into its DNA.
- **Example:** A “glow-in-the-dark” fish that has a gene from a jellyfish.

### MCQs:

1. Binary fission is a type of: (A) **Asexual reproduction** (B) Sexual reproduction © Pollination (D) Fertilization
  2. The male part of a flower is: (A) Carpel (B) **Stamen** © Ovary (D) Petal
  3. Which hormone is produced by transgenic bacteria? (A) Estrogen (B) **Insulin** © Testosterone (D) Adrenaline
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# SECTION: SOLVED FINAL TERM EXAM PAPER

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Author: ZB ZAIB

## Part 1: Multiple Choice Questions (30 MCQs)

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1. The word “Virus” is derived from Latin meaning: (A) Life (B) **Poison** © Small (D) Liquid
2. **Viruses can only reproduce:** (A) In soil (B) In water © **Inside living cells** (D) In air
3. **A virus that infects bacteria is:** (A) Viroid (B) **Bacteriophage** © Prion (D) Virion
4. **The protein shell of a virus is:** (A) Envelope (B) **Capsid** © Membrane (D) Wall
5. **Which cycle kills the host cell immediately?** (A) **Lytic** (B) Lysogenic © Calvin (D) Krebs
6. **Microbiology is the study of:** (A) Plants (B) Animals © **Microorganisms** (D) Rocks
7. **Who is the Father of Microbiology?** (A) Robert Hooke (B) **Leeuwenhoek** © Pasteur (D) Darwin

8. **Prokaryotes lack a:** (A) Cell wall (B) **Nucleus** © Ribosome (D) Membrane
9. **Kingdom Monera includes:** (A) Fungi (B) **Bacteria** © Algae (D) Protozoa
10. **Scientific names are in which language?** (A) English (B) **Latin** © Greek (D) French
11. **The resolving power of the human eye is:** (A) 1mm (B) **0.2mm** © 0.5mm (D) 0.1mm
12. **Which lens is near the eye in a microscope?** (A) Objective (B) **Eyepiece** © Condenser (D) Mirror
13. **Animals that eat only plants are:** (A) **Herbivores** (B) Carnivores © Omnivores (D) Detritivores
14. **The process of taking food into the mouth is:** (A) Digestion (B) **Ingestion** © Absorption (D) Elimination
15. **Wave-like movement in the esophagus is:** (A) **Peristalsis** (B) Digestion © Churning (D) Swallowing
16. **The stomach produces which acid?** (A) H<sub>2</sub>SO<sub>4</sub> (B) **HCl** © HNO<sub>3</sub> (D) Acetic acid
17. **Most absorption occurs in the:** (A) Stomach (B) **Small Intestine** © Large Intestine (D) Mouth
18. **Finger-like structures in the intestine are:** (A) Cilia (B) **Villi** © Flagella (D) Tentacles
19. **The study of interactions between organisms and environment is:** (A) Biology (B) **Ecology** © Zoology (D) Botany
20. **All living things in an area make a:** (A) Population (B) **Community** © Biome (D) Species
21. **The main source of energy for life is:** (A) Food (B) **Sunlight** © Water (D) Air
22. **Organisms that make their own food are:** (A) **Producers** (B) Consumers © Decomposers (D) Parasites
23. **Cutting down trees on a large scale is:** (A) Agriculture (B) **Deforestation** © Urbanization (D) Pollution
24. **Asexual reproduction involving one cell splitting into two is:** (A) **Binary Fission** (B) Budding © Fusion (D) Meiosis
25. **The male part of the flower is the:** (A) Carpel (B) **Stamen** © Petal (D) Sepal

26. **The gender of a human baby is determined by:** (A) Mother (B) **Father** © Both (D) Environment
27. **Using living things to make products is:** (A) Ecology (B) **Biotechnology** © Chemistry (D) Physics
28. **Bacteria used to make insulin is:** (A) Yeast (B) **E. coli** © Amoeba (D) Virus
29. **Keeping honeybees for honey is:** (A) Sericulture (B) **Apiculture** © Aquaculture (D) Poultry
30. **Rules about right and wrong in science are:** (A) Values (B) **Ethics** © Laws (D) Theories
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## Part 2: Short Questions (5 Questions)

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**Q1: Define “Virion” and its basic structure.**

- **Answer:** A virion is a single, complete virus particle. It consists of a core of nucleic acid (DNA or RNA) surrounded by a protective protein coat called a capsid.
- **Example:** Think of a **candy** where the sweet center is the DNA/RNA and the hard outer wrapper is the capsid.

**Q2: What is the difference between Ingestion and Digestion?**

- **Answer:** Ingestion is the act of putting food into your mouth. Digestion is the chemical and physical process of breaking that food down into tiny molecules.
- **Example:** Putting a **pizza slice** in your mouth is ingestion. Your body breaking that pizza down into sugars and proteins is digestion.

**Q3: Why are Decomposers important for the ecosystem?**

- **Answer:** Decomposers (like fungi and bacteria) break down dead plants and animals. This recycles nutrients back into the soil so new plants can grow.
- **Example:** Like a **recycling bin**. If we didn't recycle, we would run out of materials. Decomposers “recycle” nature's materials.

**Q4: What is “Pollination”?**

- **Answer:** Pollination is the transfer of pollen grains from the male part (anther) of a flower to the female part (stigma).
- **Example:** Like a **delivery service**. A bee carries pollen from one flower to another, just like a rider delivers a package to your house.

#### Q5: What is a “Transgenic” plant?

- **Answer:** A transgenic plant is one that has had a gene from another organism inserted into it to give it a useful trait, like resistance to pests.
  - **Example:** A **cotton plant** that has a special gene so that insects die if they try to eat it.
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## Part 3: Long Questions (3 Questions)

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#### Q1: Explain the steps of the Human Digestive System from mouth to stomach.

- **Answer:**
  1. **Oral Cavity:** Teeth grind food, and saliva (with amylase) starts breaking down starch. The tongue forms a “bolus.”
  2. **Pharynx & Esophagus:** The bolus is swallowed and moves down the esophagus via wave-like contractions called **peristalsis**.
  3. **Stomach:** Food is stored and mixed with gastric juice (HCl and Pepsin). HCl kills germs and Pepsin starts digesting proteins. The food becomes a soup-like liquid called **chyme**.
- **Example:** Think of a **blender**. You put in solid fruit (mouth), it travels down a pipe (esophagus), and gets whirled into a smooth juice (stomach).

#### Q2: Describe the “Lytic Cycle” of a bacteriophage.

- **Answer:**
  1. **Attachment:** The virus sticks to the bacteria.
  2. **Entry:** The virus injects its DNA into the bacteria.
  3. **Synthesis:** The bacteria’s machinery is forced to make viral parts.
  4. **Assembly:** New viruses are put together.
  5. **Release:** The bacteria bursts open (lysis), and new viruses come out.

- **Example:** Like a **hijacker** taking over a plane. He enters the cockpit, forces the pilot to fly where he wants, and eventually the plane is destroyed.

### Q3: Discuss the importance of Biotechnology in the field of Medicine.

- **Answer:** Biotechnology has revolutionized medicine. We can now use bacteria to produce human hormones like **Insulin** for diabetes and **Growth Hormone** for children. We also use it to create **Vaccines** that protect us from deadly diseases. It allows us to produce medicines that are safer, cheaper, and more effective.
  - **Example:** Before biotech, insulin was taken from cows and pigs, which caused allergies. Now, we use **E. coli** bacteria to make “human” insulin, which is perfectly safe. It’s like having a **factory of tiny workers** making exactly what we need.
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## SECTION: IMPORTANT DEFINITIONS

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**Author: ZB ZAIB**

1. **Virus:** A tiny parasite that needs a host cell to reproduce.
2. **Capsid:** The protective protein shell of a virus.
3. **Bacteriophage:** A virus that specifically infects bacteria.
4. **Prokaryote:** A simple cell without a nucleus (e.g., Bacteria).
5. **Eukaryote:** A complex cell with a nucleus (e.g., Human cell).
6. **Microbiology:** The study of tiny organisms called microbes.
7. **Herbivore:** An animal that eats only plants.
8. **Omnivore:** An animal that eats both plants and meat.
9. **Peristalsis:** Wave-like muscle movements that push food through the digestive tract.
10. **Villi:** Tiny finger-like structures in the small intestine that absorb nutrients.
11. **Ecology:** The study of how living things interact with their environment.
12. **Ecosystem:** A community of living things and their non-living surroundings.
13. **Deforestation:** The large-scale cutting down of trees.

14. **Binary Fission:** A type of asexual reproduction where one cell splits into two.
  15. **Pollination:** The transfer of pollen from the male to the female part of a flower.
  16. **Biotechnology:** Using living organisms to make useful products.
  17. **Transgenic:** An organism containing a gene from another species.
  18. **Biosafety:** Testing genetically modified products to ensure they are safe.
  19. **Ethics:** Rules that define what is right and wrong in scientific research.
  20. **Assimilation:** Using absorbed nutrients to build the body or get energy.
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## SECTION: COMPREHENSIVE QUIZ (100+ MCQs)

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**Author: ZB ZAIB**

*(Note: For brevity, the most critical 100 conceptual MCQs are compiled here based on the syllabus 66-130)*

1. **The word “Virus” means:** (A) Life (B) **Poison** © Small (D) Liquid
2. **Viruses are:** (A) Cellular (B) **Acellular** © Multicellular (D) Large
3. **Viruses reproduce only in:** (A) Water (B) Soil © **Living cells** (D) Air
4. **A complete virus particle is a:** (A) Capsid (B) **Virion** © Genome (D) Envelope
5. **Bacteriophages infect:** (A) Humans (B) Plants © **Bacteria** (D) Fungi
6. **The Lytic cycle results in:** (A) Cell growth (B) **Cell death** © Cell fusion (D) No change
7. **In the Lysogenic cycle, viral DNA is called:** (A) Virion (B) **Prophage** © Capsid (D) Plasmid
8. **Microbiology is the study of:** (A) Plants (B) **Microbes** © Animals (D) Rocks
9. **Who saw “animalcules” first?** (A) Hooke (B) **Leeuwenhoek** © Pasteur (D) Koch
10. **Prokaryotes have:** (A) Nucleus (B) **Ribosomes** © Mitochondria (D) Golgi
11. **Kingdom for bacteria is:** (A) **Monera** (B) Protista © Fungi (D) Plantae

12. **Robert Whittaker proposed how many kingdoms?** (A) 3 (B) 4 © 5 (D) 6
13. **Binomial nomenclature was given by:** (A) Darwin (B) **Linnaeus** © Lamarck (D) Mendel
14. **Scientific name for Humans is:** (A) *Homo habilis* (B) ***Homo sapiens*** © *Homo erectus* (D) *Pan troglodytes*
15. **The resolving power of the human eye is:** (A) 1mm (B) **0.2mm** © 0.1mm (D) 0.5mm
16. **100x objective lens is used with:** (A) Water (B) **Oil** © Air (D) Alcohol
17. **Herbivores eat:** (A) Meat (B) **Plants** © Both (D) Dead matter
18. **Humans are:** (A) Herbivores (B) Carnivores © **Omnivores** (D) Detritivores
19. **Taking food in is:** (A) **Ingestion** (B) Digestion © Absorption (D) Elimination
20. **Breaking food down is:** (A) Ingestion (B) **Digestion** © Absorption (D) Elimination
21. **Saliva contains which enzyme?** (A) Pepsin (B) **Amylase** © Lipase (D) Trypsin
22. **The tube connecting mouth to stomach is:** (A) Trachea (B) **Esophagus** © Bronchus (D) Ureter
23. **Peristalsis occurs in:** (A) Heart (B) **Esophagus** © Lungs (D) Brain
24. **Stomach acid is:** (A) **HCl** (B) H<sub>2</sub>SO<sub>4</sub> © HNO<sub>3</sub> (D) CH<sub>3</sub>COOH
25. **Pepsin digests:** (A) Fats (B) **Proteins** © Carbs (D) Vitamins
26. **Small intestine parts are:** (A) 2 (B) **3** © 4 (D) 5
27. **Villi are found in:** (A) Stomach (B) **Small Intestine** © Large Intestine (D) Mouth
28. **Bile is stored in:** (A) Liver (B) **Gallbladder** © Pancreas (D) Stomach
29. **Large intestine absorbs:** (A) Food (B) **Water** © Protein (D) Fat
30. **Study of environment is:** (A) Biology (B) **Ecology** © Zoology (D) Botany
31. **Living factors are:** (A) Abiotic (B) **Biotic** © Physical (D) Chemical
32. **Non-living factors are:** (A) **Abiotic** (B) Biotic © Biological (D) Organic
33. **Main energy source is:** (A) Plants (B) **Sun** © Water (D) Soil
34. **Plants are:** (A) **Producers** (B) Consumers © Decomposers (D) Parasites
35. **Animals are:** (A) Producers (B) **Consumers** © Decomposers (D) Autotrophs
36. **Fungi are:** (A) Producers (B) Consumers © **Decomposers** (D) Autotrophs
37. **Cutting trees is:** (A) **Deforestation** (B) Reforestation © Agriculture (D) Farming

38. **Asexual reproduction needs:** (A) **1 parent** (B) 2 parents © 3 parents (D) No parents
39. **Binary fission occurs in:** (A) Humans (B) **Bacteria** © Trees (D) Birds
40. **Budding occurs in:** (A) **Yeast** (B) Humans © Dogs (D) Fish
41. **Starfish shows:** (A) Fission (B) **Regeneration** © Budding (D) Fusion
42. **Male part of flower:** (A) Carpel (B) **Stamen** © Sepal (D) Petal
43. **Female part of flower:** (A) **Carpel** (B) Stamen © Anther (D) Filament
44. **Pollination by same flower is:** (A) **Self** (B) Cross © Wind (D) Water
45. **Ripened ovary is:** (A) Seed (B) **Fruit** © Flower (D) Leaf
46. **Human sperm has how many chromosomes?** (A) 46 (B) **23** © 22 (D) 44
47. **Male chromosome is:** (A) X (B) **Y** © Z (D) W
48. **Female chromosome pair is:** (A) **XX** (B) XY © YY (D) XZ
49. **Testes produce:** (A) Eggs (B) **Sperms** © Estrogen (D) Insulin
50. **Ovaries produce:** (A) Sperms (B) **Ova** © Testosterone (D) Adrenaline
51. **Biotechnology started in:** (A) 1950s (B) **1970s** © 1990s (D) 2000s
52. **Organism with foreign gene is:** (A) Mutant (B) **Transgenic** © Hybrid (D) Clone
53. **Bacterial DNA used in biotech is:** (A) **Plasmid** (B) Capsid © Nucleus (D) Ribosome
54. **Enzymes that cut DNA are:** (A) Ligases (B) **Restriction enzymes** © Polymerases (D) Amylases
55. **Insulin is for:** (A) Cancer (B) **Diabetes** © Fever (D) Cough
56. **BT Cotton is resistant to:** (A) Water (B) **Insects** © Heat (D) Cold
57. **Testing for safety is:** (A) **Biosafety** (B) Biosecurity © Bioethics (D) Biology
58. **Aquaculture is for:** (A) Bees (B) **Fish** © Silk (D) Birds
59. **Sericulture is for:** (A) Honey (B) **Silk** © Milk (D) Eggs
60. **Apiculture is for:** (A) Silk (B) **Honey** © Meat (D) Wool
61. **Biological control uses:** (A) Chemicals (B) **Living things** © Fire (D) Water
62. **Lady beetles control:** (A) **Citrus pests** (B) Cotton pests © Wheat pests (D) Rice pests
63. **Science comes from Latin:** (A) **Scio** (B) Bio © Geo (D) Physio

64. **Ethics means:** (A) **Right/Wrong** (B) Fast/Slow © Big/Small (D) Hot/Cold
65. **Which is a biotic factor?** (A) Air (B) Water © **Plants** (D) Soil
66. **Which is an abiotic factor?** (A) Bacteria (B) **Light** © Fungi (D) Animals
67. **Primary consumers are:** (A) **Herbivores** (B) Carnivores © Omnivores (D) Decomposers
68. **Secondary consumers are:** (A) Herbivores (B) **Carnivores** © Producers (D) Plants
69. **Energy flow is:** (A) Cyclic (B) **One-way** © Two-way (D) Random
70. **Smallest unit of life is:** (A) Atom (B) Molecule © **Cell** (D) Organ
71. **Group of same species is:** (A) **Population** (B) Community © Ecosystem (D) Biome
72. **Physical location of organism is:** (A) **Habitat** (B) Niche © Biome (D) Area
73. **Role of organism in ecosystem is:** (A) Habitat (B) **Niche** © Job (D) Place
74. **Fresh water has:** (A) High salt (B) **Low salt** © No salt (D) Only salt
75. **Marine water is:** (A) **Oceans** (B) Rivers © Lakes (D) Ponds
76. **Endotherms are:** (A) Cold-blooded (B) **Warm-blooded** © No blood (D) Blue blood
77. **Birds have:** (A) Heavy bones (B) **Hollow bones** © No bones (D) Soft bones
78. **Mammals feed young with:** (A) Water (B) **Milk** © Honey (D) Grass
79. **Amoeba reproduces by:** (A) **Binary fission** (B) Budding © Seeds (D) Eggs
80. **Hydra reproduces by:** (A) Fission (B) **Budding** © Seeds (D) Eggs
81. **Zygote is:** (A) Haploid (B) **Diploid** © Triploid (D) No set
82. **Meiosis produces:** (A) 2 cells (B) **4 cells** © 1 cell (D) 8 cells
83. **Mitosis produces:** (A) **2 cells** (B) 4 cells © 1 cell (D) 8 cells
84. **Spermatogenesis is formation of:** (A) Eggs (B) **Sperms** © Blood (D) Bone
85. **Oogenesis is formation of:** (A) Sperms (B) **Ova** © Skin (D) Hair
86. **Pollination by wind is:** (A) Hydrophily (B) **Anemophily** © Entomophily (D) Zoophily
87. **Pollination by insects is:** (A) Hydrophily (B) Anemophily © **Entomophily** (D) Zoophily
88. **Yeast is a:** (A) Bacteria (B) **Fungus** © Virus (D) Plant

89. **Penicillin is an:** (A) Antiviral (B) **Antibiotic** © Antifungal (D) Antiseptic
90. **Vaccines provide:** (A) Food (B) **Immunity** © Energy (D) Sleep
91. **E. coli is found in:** (A) Lungs (B) **Intestine** © Brain (D) Heart
92. **Staphylococcus is:** (A) Rod-shaped (B) **Spherical** © Spiral (D) Comma-shaped
93. **Aureus means:** (A) Silver (B) **Gold** © Red (D) Blue
94. **Father of Taxonomy is:** (A) Darwin (B) **Linnaeus** © Aristotle (D) Plato
95. **Five kingdom system was given in:** (A) 1950 (B) **1969** © 1980 (D) 1990
96. **Which is a multicellular fungus?** (A) Yeast (B) **Mushroom** © Bacteria (D) Amoeba
97. **Which is a unicellular fungus?** (A) **Yeast** (B) Mushroom © Bread mold (D) Puffball
98. **Algae have cell walls made of:** (A) Chitin (B) **Cellulose** © Peptidoglycan (D) Protein
99. **Fungi have cell walls made of:** (A) **Chitin** (B) Cellulose © Peptidoglycan (D) Protein
100. **Bacteria have cell walls made of:** (A) Chitin (B) Cellulose © **Peptidoglycan** (D) Protein
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## SECTION: FINAL GUIDANCE & MOTIVATION

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**Author: ZB ZAIB**

Dear Students,

As you prepare for your Final Term exams, remember that **Virtual University (VU) exams are conceptual**. They do not just test your memory; they test your understanding.

**My Advice to You:**

1. **Handouts are Gold:** The official LMS handouts are the only 100% reliable source. Read them at least **three times**.

2. **Avoid Shortcuts:** Do not rely on random WhatsApp files or “short notes” that skip important details. They might help you pass, but they won’t give you a **4.0 CGPA**.
3. **Focus on “Why”:** When you read a topic, ask yourself “Why is this happening?” and “How does this work in real life?”
4. **Use Examples:** Always try to relate biological concepts to your daily life, just like the examples provided in this file.
5. **Stay Motivated:** Hard work never goes to waste. As the Quran says, you get what you work for.

**Best of luck for your exams! You can do it!**

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**“Focus on Understanding, Success will follow.”**

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