**Q1: Fill in the Blanks.**

1. **Microorganisms** are living things which individually are too small to be seen with naked eye.
2. The scientific study of algae is called **Phycology**.
3. Diseases causing living organisms are known as **Pathogens**.
4. **Mitochondria** cell organelle is present both in prokaryotic and eukaryotic cell.
5. The power house of cell is known as **Mitochondria**.
6. **Binary fission** is the most common method of asexual reproduction in microbes.
7. Log period of bacterial growth is also known as **logarithmic phase or the exponential phase** .
8. **Lag phase** of microbial growth is metabolically active and is for industrial purposes.
9. Shrinkage of cell’s plasma membrane caused by osmotic loss of water is called **Plasmolysis**.
10. For synthesis of cellular material nitrogen and sulfur is needed for **Protein** synthesis.

**Q2: Write short notes on the following**

1. **Mitochondria**:-

Mitochondria is an organelle found in large numbers in both prokaryotic and eukaryotic cells.

**Structure**: It has a double membranous structure, the inner part being folded inwards to form layers .

**Function**: In mitochondria the biochemical processes of respiration and energy production occur. It make energy from sugar + O2 i.e.

sugar + O2 → ATP

1. **Nucleus:-**

**Structure**: The nucleus is a membrane-bound organelle that contains genetic material (DNA) of eukaryotic organisms.

**Function:** This organelle has two major functions: it stores the cell's hereditary material, or DNA, and it coordinates the cell's activities, which include growth, intermediary metabolism, protein synthesis, and reproduction (cell division). Only the cells of advanced organisms, known as eukaryotes, have a nucleus.

1. **Budding:-**

Budding is a type of [asexual reproduction](https://en.wikipedia.org/wiki/Asexual_reproduction) in which a new organism develops from an outgrowth or bud due to cell division at one particular site. The small bulb-like projection coming out from the yeast cell is called a bud. Since the reproduction is asexual, the newly created organism is a clone and excepting mutations is genetically identical to the parent organism.

Organisms such as [hydra](https://en.wikipedia.org/wiki/Hydra_(genus)) use regenerative cells for reproduction in the process of budding.

1. **Culture medium:-**

A growth medium or culture medium is a solid, liquid or semi-solid designed to support the growth of [microorganisms](https://en.wikipedia.org/wiki/Microorganism) or [cells](https://en.wikipedia.org/wiki/Cell_(biology)). Different types of media are used for growing different types of cells.

The two major types of growth media are those used for [cell culture](https://en.wikipedia.org/wiki/Cell_culture), which use specific cell types derived from plants or animals, and [microbiological culture](https://en.wikipedia.org/wiki/Microbiological_culture), which are used for growing microorganisms, such as [bacteria](https://en.wikipedia.org/wiki/Bacteria) or [fungi](https://en.wikipedia.org/wiki/Fungi). The most common growth media for microorganisms are nutrient broths and [agar plates](https://en.wikipedia.org/wiki/Agar_plate); specialized media are sometimes required for microorganism and cell culture growth.

1. **Growth Factors:-**

Growth factor is a naturally occurring substance capable of stimulating [cellular growth](https://en.wikipedia.org/wiki/Cellular_growth), proliferation, healing, and [cellular differentiation](https://en.wikipedia.org/wiki/Cellular_differentiation). Usually it is a [protein](https://en.wikipedia.org/wiki/Protein) or a [steroid hormone](https://en.wikipedia.org/wiki/Steroid_hormone). Growth factors are important for regulating a variety of cellular processes. Growth factors typically act as signaling molecules between cells. Examples are [cytokines](https://en.wikipedia.org/wiki/Cytokine) and [hormones](https://en.wikipedia.org/wiki/Hormone) that bind to specific [receptors](https://en.wikipedia.org/wiki/Receptor_(biochemistry)) on the surface of their target [cells](https://en.wikipedia.org/wiki/Cell_(biology)).

**Q3:What is bacterial growth? Discus different phases of bacterial growth.**

Bacterial growth is proliferation of [bacterium](https://en.wikipedia.org/wiki/Bacteria) into two daughter cells, in a process called [binary fission](https://en.wikipedia.org/wiki/Binary_fission). Providing no event occurs, the resulting daughter cells are genetically identical to the original cell. Hence, bacterial growth occurs. Both daughter cells from the division do not necessarily survive.

**Phases of bacterial growth:-**

The growth of bacteria is modeled in the form of different phases like lag phase, log phase or exponential phase, stationary phase and death phase.

1. **Lag phase:-**

In this phase bacteria prepare themselves to growth conditions. This is the phase in which bacteria are maturing and not yet able to divide.

1. **Log Phase:-**

It is also called logarithmic or exponential phase. It is the period characterized by cell doubling. The number of new bacteria appearing per unit time is proportional to the present population. If growth is not limited, doubling will continue at a constant rate so both the number of cells and the rate of population increase doubles with each consecutive time period.

1. **Stationary phase:-**

The stationary phase is often due to a growth-limiting factor such as the depletion of an essential nutrient, and the formation of an inhibitory product such as an organic acid. Stationary phase results from a situation in which growth rate and death rate are equal. The number of new cells created is limited by the growth factor and as a result the rate of cell growth matches the rate of cell death.

1. **Death phase:-**

At death phase is also called as decline phase. In this phase the bacteria die due to the lack of nutrients, environmental restrictions such as temperature, pH, or other injurious conditions.