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**Section : A**  
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### **Q1: Fill In The Blanks.**

1. Micro organisms are living things which individual are too small to be seen with naked eye.
2. The scientific study of algae is called phycology.
3. Disease causing living organisms are known as pathogenic
4. Ribosome 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 log 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 protein synthesis.

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

#### **1.Mitochondria:**

Mitochondria are membranous, sausage shape structure in the cytoplasm. Mitochondria are also called " Powerhouse" of the cells. They are central to aerobic respiration, the process by which chemical energy is make available in the cell. This is in the form of ATP, which releases energy when the cell break it down. The most active cells have the greatest number of mitochondria. ( e.g ) Muscle , Liver and spermatozoa.

#### **2.Nucleus:**

Nucleus is the control centre of the cells. It serves to maintain the integrity by facilitating transcription and replication process. All body cells have a nucleus with except of mature erythrocytes (RBCs).

Nucleus is the largest organelles and contains within the nuclear enveloped. The membrane similar to the plasma membrane with tiny pores through some substances can pass between it and the cytoplasm.

Nucleus contains the body genetic materials in the form of DNA.

### **3.Budding:**

Budding is a type of 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.

Organism such as hydra use regenerative cells for reproduction in the process of budding.

In hydra, a bud develops as an outgrowth due to repeated cell division at one specific site. These buds develop into tiny individuals and when fully mature, detach from the parent body and become new independent individuals.

### **4.Culture Media:**

A growth medium or culture medium is a solid, liquid or semi solid designed to support the growth of microorganisms or cells, or small plants like the moss *Physcomitrella patens*.

Different types of cells.

The major types of growth media are those used for cell culture, which use specific cell types derived from plants or animals and microbiological culture.

Which are used for growing microorganisms such as bacteria or fungi. The most common growth media for microorganisms are nutrient broths and agar plates; specialized media are sometimes required for microorganism and cell culture growth. Some organisms, termed fastidious organisms, require specialized environments due to complex nutritional requirement. Viruses, for example are obligate intracellular parasites and require a growth medium containing living cells.

### **5.Growth Factors:**

A growth factor is a naturally occurring substance capable of stimulating cellular growth, proliferation, healing and cellular differentiation. Usually it is a protein or a steroid hormones. Growth factor are important for regulating a variety of cellular processes.

Growth factors typically act as signaling molecules between cells. Examples are cytokines and hormones that bind to specific receptors on the surface of their target cells.

They often promote cell differentiation and maturation, which varies between growth factors.

For example, epidermal growth factor (EGF) enhances osteogenic differentiation, while fibroblast growth factors and vascular endothelial growth factors stimulate blood vessel differentiation (angiogenesis).

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

**ANS:** Bacterial growth is proliferation of bacterium into two daughter cells, in a process called 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. However, if the number surviving exceeds unity on average, the bacterial population undergoes exponential growth. The measurement of an exponential bacterial growth curve in batch culture was traditionally a part of the training of all microbiologists; the basic mean requires bacterial enumeration (cell counting) by direct and individual (microscopic, flow cytometry), direct and bulk (biomass), indirect and individual (colony counting).

which is the following phases.

- **Lag phase**
- **Log phase**
- **Stationary phase**
- **Death phase**

#### **Lag Phase:**

During lag phase, bacteria adapt themselves to growth conditions. It is the period where the individual bacteria are maturing and not yet able to divide. During the lag phase of the bacterial growth cycle, synthesis of RNA, enzyme and other molecules occurs. During the lag phase cell change very little because the cell do not immediately reproduce in a new medium. The period of little to no cell division is called the lag phase and can last for 1 hour to several days. During this phase cells do not dormant.

#### **Log phase:**

The log phase is sometimes called the logarithmic phase or the exponential phase is a 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 double with each consecutive time period. For this type of exponential growth, plotting the natural logarithm of cell number against time produces a straight line. The slope of this line is the specific growth rate of the organisms, which is a measure of the number of divisions per cell per unit time. The actual rate of this growth (i.e. the slope of the line in the figure) depends upon the growth conditions, which affect the frequency of the cell division events and the probability of both daughter cells surviving. Under controlled conditions, cyanobacteria can double their population four times a day and then they triple their population.

Exponential growth cannot continue indefinitely, however, because the medium is soon depleted of nutrients and enriched with wastes.

### **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 as a result the rate of cell growth matches the rate of cell death. The result is a smooth, horizontal linear part of the curve during the stationary phase. Mutations can occur during stationary phase. Bridges et al presented evidence that DNA damage is responsible for many of the mutations arising in the genomes of stationary phase or starving bacteria. Endogenously generated reactive oxygen species appear to be a major source of such damages.

### **Death Phase:**

At death phase (decline phase), bacteria die.

This could be caused by lack of nutrients environmental temperature above or below the tolerance band for the species, or other injurious conditions.