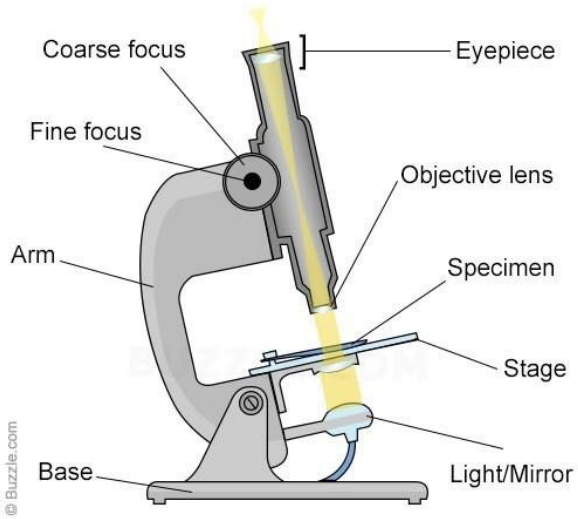
1. Bacteria(unicellular & prokaryotes) and Protozoa(Unicellular & eukaryotes) are two groups of unicellular microorganisms
2. A microscope is an instrument that makes an enlarged image of a small object, thus revealing details too small to be seen by the unaided eye.



3. Viruses are not made up of cell. They do not follow the cell theory. They are on the borderline of living and non living ,they are non living when they do not find a host and they become living after finding a host cell while on the other hand other microorganisms are generally living . Viruses use the machinery of the host cell while other microorganisms use their own machinery.
4. *Lactobacillus* sp. is responsible for curdling of milk.
5. **Fermentation**, chemical process by which molecules such as glucose are broken down anaerobically. More broadly, fermentation is the foaming that occurs during the manufacture of wine and beer, a process at least 10,000 years old. The frothing results from the evolution of carbon dioxide gas, though this was not recognized until the 17th century. French chemist and microbiologist Louis Pasteur in the 19th century used the term *fermentation* in a narrow sense to describe the changes brought about by yeasts and other microorganisms growing in the absence of air (anaerobically).
6. Yeast is involved in the production of alcohol. Yeast is a unicellular fungus.
7. Rhizobium & Azotobacter
8. Microorganism plays very important role in agriculture because the soil microbes (bacteria and fungi) are essential for decomposing organic matter and recycling old plant material. Some soil bacteria form relationships with plant roots that provide important nutrients like nitrogen or phosphorus. E.g., Rhizobium(involved in nitrogen fixation).
9. Yeast is used for the leavening of bread. Yeast uses the sugars and oxygen in dough to produce more yeast cells and carbon dioxide gas. ... The carbon dioxide makes the dough rise which gives the bread a light and spongy texture.

10. Yeast and Grapes

11.

Antibiotic	Producer organism
Penicillin	*Penicillium chrysogenum*
Cephalosporin	*Cephalosporium acremonium*
Griseofulvin	*Penicillium griseofulvum*
Bacitracin	*Bacillus subtilis*
Polymyxin B	*Bacillus polymyxa*
Amphotericin B	*Streptomyces nodosus*
Erythromycin	*Streptomyces erythreus*
Neomycin	*Streptomyces fradiae*
Streptomycin	*Streptomyces griseus*
Tetracycline	*Streptomyces rimosus*
Vancomycin	*Streptomyces orientalis*
Gentamicin	*Micromonospora purpurea*
Rifamycin	*Streptomyces mediterranei*

12. a)The microorganisms decompose dead organic wastes of plants and animals converting them into simple substances. These substances are again used by other plants and animals.
Thus, microorganisms can be used to degrade the harmful and smelly substances and thereby cleans up the environment.
b)Certain types of bacteria can actually clean up troublesome environmental pollutants like spilled petroleum. In fact, a specific strain called *Alcanivorax* drastically increases in population when an oil spill provides them with large amounts of food, so that they're able to remove much of the oil.
c)In villages, animal waste, leafy waste from crops, etc. is decomposed by bacteria in the absence of oxygen to produce methane, which is used as a fuel. It is one of the chief constituents of biogas. Biogas serves as a cheap, clean and efficient fuel for cooking and lighting purposes.

13. Some microorganisms such as nitrogen-fixing bacteria are found in the root nodules of leguminous plants. Within legume root nodules, nitrogen gas (N_2) from the atmosphere is converted into ammonia (NH_3), which is then assimilated into amino acids (the building blocks of proteins), nucleotides (the building blocks of DNA and RNA as well as the important energy molecule ATP), and other cellular constituents such as vitamins, flavones, and hormones
14. Fungi (in plants- Apple scab and rust of wheat, in human- ringworm)
15. Pathogens are diseases causing microbes.
16. Malaria-*Plasmodium*, Kala-Azar-*Leishmania*, Sleeping sickness-*Trypanosoma* etc.
17. Mosquitoes and flies

18. Practice good pond mosquito control. If you have a pond or still water on your property, you may not be able to remove it. You can make it less of a mosquito haven, however, by adding mosquito fish – also known as *Gambusia affinis*. A single fish can eat more than 200 mosquito larvae in 60 minutes. Another option for your pond is to introduce bacteria known as Bt(*Bacillus thuringiensis*) to kill larvae in your pond.
    Cover rainwater barrels. Keep your barrels covered with a fine mesh fabric to prevent mosquitoes from getting through. You can also keep the barrel covered even when rain isn't coming as a more permanent preventative measure. If covering isn't an option, you can empty out your barrels within 24 hours of a rain before larvae have a chance to hatch.
    Have a running birdbath. Birdbaths usually contain still water, but you can eliminate this problem by introducing a small pump to keep the water moving. If this keeps the birds away, you can schedule daily replacement of the water to keep mosquitoes from breeding.
    Eliminate debris and hiding spots on your property. Frequent cleanup eliminates, empty containers or surfaces where still water can collect. Regular maintenance can also mean trimming back grasses and other plant life so mosquitoes can't hide there.
    Take a close look at your garden. Garden ornaments, flowerpots, and even paving stones can collect water and become a breeding ground for mosquitoes. For potted plants, encourage good drainage. This will improve the health of your plants, while also preventing mosquitoes. For garden ornaments, look for hollow pieces with small drilled holes to allow water to drain away.
19. Communicable diseases spread from one person to another or from an animal to a person. Communicable diseases, also known as infectious diseases or transmissible diseases, are illnesses that result from the infection, presence and growth of pathogenic (capable of causing disease) biological agents in an individual human or other animal host. E.g.,(Malaria, chickenpox(in humans) & Citrus canker & Apple scab(in plants).
20. When a disease carrying microbe enters our body, the body produces antibody to find the invader. The body also remembers how to find the microbe if enters again. When an antigen enters the body, the immune system produces antibodies against it. White blood cells can also produce chemicals called antitoxins which destroy the toxins (poisons) some bacteria produce when they have invaded the body.
21. Malaria is caused by Plasmodium which is a Protozoan.
22. Viruses are not affected by antibiotics as viruses use host cells to perform their activities. So, they cannot kill viruses. That's why antibiotics are not effective for viral diseases.
23. *Preservatives* are natural or man-made chemicals that are added to foods to stop them from spoiling. Sugar(in jams) & salt(pickles) are common preservatives.
24. Bread Mold- If a slice of bread was left outside for a few days, some light hairy kind of growth can be seen on its surface. This growth is called bread mold. The bread mold is actually a kind of fungus. The spore from the fungus is being blown about by the wind and it will eventually reach the surface of the bread.
25. Inadequately sterilized canned food may be spoilt by *Clostridium botulinum* .Consuming such food can cause a serious illness called food poisoning or botulism.

    Multiple choice question

    I. D) Microorganisms are living organisms that can only be seen through microscope.
    II. D) Viruses reproduce inside plant and animals. Viruses become living after finding a host cell.
    III. B) Mushroom can be seen by naked eyes.

    Change spelling of Amoebae as *Amoeba* in question.

IV. B) Chemicals that kill or stop the growth of disease causing bacteria are called antibiotics.
V. A) Fermentation is the process by which Yeast produces CO_2 during baking.
VI. C) Edward Jenner created vaccine for small pox.
VII. C) The term antibiotic was first used by Waksman. Selman **Waksman**, the microbiologist who **discovered** streptomycin, **first used the word** "**antibiotic**" in the medical sense in 1943.
VIII. A) Pasteurisation is a method used for preserving milk.(refer page 23)
IX. D) Alcohol from sugar is produced by using yeast by the fermentation process.
X. A) Fermentation is the process by which Yeast produces CO_2 during bread formation. Change the option A as Bread in question
XI. B) Measles, mumps & hepatitis all are viral disease.(refer table on page 22)
XII. D) Tuberculosis is caused by bacterium *Mycobacterium tuberculosis*.(refer table on page 22)
XIII. *D) Rhizobium* has the ability to fix nitrogen.(Refer topic nitrogen fixation on page 18)
XIV. C) Consuming stale food can cause a serious illness called food poisoning or botulism.
XV. C) Diabetes can not be transmitted from one person to another and it is not caused by any pathogen.
XVI. *C)* Carrier for dengue fever is *Aedes* mosquito.(Refer 5th point under topic disease on page 22)
XVII. C) Pathogens are diseases causing microbes.
XVIII. *D)* Diptheria, typhoid & tuberculosis are diseases caused by bacteria.
XIX. C) Anthrax is caused by *Bacillus anthracis(bacterium).*
XX. *B)* Amoebic dysentery is caused by protozoan *Entamoeba histolytica* & is transmitted by using contaminated water.
XXI. A) Small pox has been eradicated from the world.
XXII. A) Citrus canker in plants(citrus) is caused by bacteria.
XXIII. D) Sodium meta-bisulphite is a food preservative.
XXIV. D) Food spoilage can be detected by odour, discoloration & sour taste.
XXV. A) **BCG** stands for Bacillus Calmette Guerin. It is effective immunization against tuberculosis.

LEVEL-II

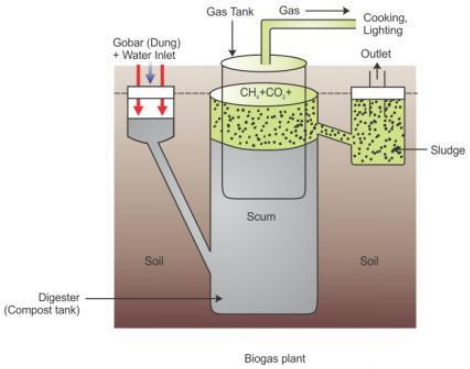
I. D) Process of biogas production is anaerobic process.
II. C) **Probiotics** are live bacteria and yeasts that are good for you, especially your digestive system. Probiotics are live microbial food supplement.
III. A) i)*Lactobacillus acidophil*- Conversion of milk into curd
ii) *Saccharomyces cerevisiae*- Formation of dough
iii) *Propionibacterium sharmanii*- Formation of Swiss cheese
IV. C) Inoculum-A small amount of material containing bacteria, viruses, or other microorganisms that is used to start a culture. The inoculum is added to the fresh milk in order to convert milk into curd, the term 'inoculum' here refers to a starter containing millions of LAB.
V. C) *Methanobacterium* is present in the rumen of cattle.
VI. C) Lactobacillus converts lactose sugar to lactic acid, which causes coagulation of casein(milk) protein, which improves nutritional quality by increasing Vitamin B12 content.
VII. A) When a natural predator (living organism) is applied on the other pathogen organisms to control them, this process is called as biological control, as living organisms are used.
VIII. D) Some bacteria grow anaerobically on cellulosic material, produce large amount of methane along with CO_2 and H_2 and are collectively called as methanogens. All the bacteria in the question are methanogens.

IX. C) The chemical substances produced by some microbes which can kill or retard the growth of other microbes are called antibiotics(anti-against+biotics-life).

X. D) Methanogens bacteria grow anaerobically on cellulosic material, produce large amount of methane along with CO_2 and H_2.

XI. A) *Lactobacillus bulgaricus* and *Streptococcus thermophiles* are responsible for the formation flavor of yoghurt.

XII. A) Refer the diagram.



Biogas plant