

Chapter 10

Microbes in Human Welfare

1 Marks Questions

1. How does a small amount of curd added to fresh milk convert it into curd?

Mention a nutritional quality that get added to the curd.

Ans. A large number of lactic acid bacteria are found in small amount of curd which multiply and convert the milk into curd by producing the lactic acid. The nutritional quality improves by increasing Vitamin B12.

2. Why is secondary treatment of water in sewage treatment plant called biological treatment?

Ans. In this treatment Organic wastes of sewage water are decomposed by certain microorganisms in presence of water.

3. An antibiotic called 'Wonder Drug' was used to treat the wounded soldiers of America during World War-II. Name the drug and the scientist who discovered it.

Ans. Penicillin, Alexander Fleming.

4. You have observed that fruit juice in bottles bought from the market are clearer as compared to those made at home. Give reason.

Ans. Bottle juices are clarified by the use of pectinase and proteases.

5. Alexander Fleming discovered 'Penicillin', but its full potential as an effective antibiotic was established by other scientists. Name the two scientists.

Ans. Ernest chain and Howard Florey.

6. Name the plant whose sap is used in making 'Toddy'. Mention the process involved in it.

Ans. Palm tree, by fermentation.

7. What is the medical use of cyclosporin A.

Ans. Cyclosporin A is used as an immunosuppressive drug during organ transplantation.

8.Name the pests that lady bird & dragon flies help to get rid off respectively?

Ans. Lady bird beetle is useful to get rid off aphids & dragon – flies control mosquitoes.

9.Give an example to prove that microbes release gases during metabolism?

Ans. The best example of microbes release gases during metabolism are the puffed dough & bread.

10.What are interferons?

Ans. Proteins released by cells in response to viral infection which they help to combat are called interferons.

11.Name the enzyme which is used as clot buster” to remove blood clot from blood vessels of patients.

Ans. Streptokinase.

12.Name the first antibiotic manufactured & also name its source microorganism.

Ans. Penicillin obtained from penicillium notatum.

13.Name any two fungus which are used in production of antibiotics?

Ans. Penicillium notatum, cephalosporium acremonium.

14.Expand LAB?

Ans. Lactic acid Bacteria

15.Name any two free – living nitrogen fixing bacteria.

Ans. Azotobacter, Azospirillum

16.Name the organism used in the dough for making bread.

Ans. Saccharomyces cerevisiae.

17.Name the fungus used as a biocontrol of plant diseases.

Ans. Trichoderma.

18.Name any two gases produced during secondary treatment of Sewage?

Ans. Methane, Hydrogen sulphide & carbon dioxide.

2 Marks Questions

1. Name two alcoholic drinks produced in each of the following ways.

(i) by distillation and (ii) without distillation.

Ans. (i) Whisky, brandy, rum – by distillation

(ii) Wine, beer – without distillation

2. Lactic Acid Bacteria (LAB) is commonly used in the conversion of milk into curd. Mention any two other functions of LAB that are useful to humans.

Ans. (i) LAB in human intestine synthesizes Vitamin B12.

(ii) LAB in human stomach checks the growth of harmful microbes.

3. How do mycorrhizae function as biofertilisers? Explain with example.

Ans. Mycorrhizae are fungi associated with the roots of plants. Many members of genus Glomus form mycorrhiza. These fungal symbionts absorb water and minerals like phosphorus from the soil and provide them to the plant.

2. What is biochemical oxygen demand (BOD) test? At what stage of Sewage treatment this test is performed? BOD level of three samples of water labelled as A, B and C are 30 mg/L, 10mg/L and 500 mg/L respectively. Which sample of water is most polluted?

Ans..

- The BOD test measures the rate of uptake of oxygen by microorganisms in a sample of water.
- Biological treatment or Secondary treatment
- Sample C is most polluted because it has the highest BOD level among the three samples of water.

. What are biofertilisers? A farmer is advised to add a culture of bacterium in the soil before sowing the crop. Name the bacterium in the culture. How is this bacterium useful to the crop?

Ans.

- Biofertilisers are organisms that enrich the nutrient quality of the soil.
- Azotobacter/Azospirillum (free living)
- This bacterium fixes atmospheric nitrogen into organic forms, which is used by the plants as nutrient.

5. What are statins? Name the microorganism that produces this substance. How is it medically important?

Ans. Statins are cholesterol reducing agents.

- They are produced by *Monascus purpureus* (Yeast)
- They act by Competitively inhibiting the enzymes responsible for synthesis of cholesterol and are used as blood cholesterol lowering agents.

6. Describe the procedure involved in Sewage treatment?

Ans. For treatment of sewage waste, following procedure are followed :-

i) PRIMARY TREATMENT :- It is the physical separation of suspended solids in settling tanks to lower BOD. To remove solid fraction the raw Sewage is piped into huge open tanks where they are Subjected to anaerobic digestion.

ii) SECONDARY TREATMENT :- Secondary treatment relies aerobic or anaerobic microbial activity. The methods employed in secondary treatment:-

a) filtration by sand filters

b) Aeration process

c) Use of oxidation ponds.

The sludge with accumulates after secondary treatment is disposed off after drying & effluent is allowed for tertiary treatment

iii) TERTIARY TREATMENT :- It includes chemical treatment to remove inorganic compounds & Pathogenic microorganism. Chlorination is the usually employed method of disinfection.

7. What is Biogas? How is it produced & Name the microbes involved in Biogas production.

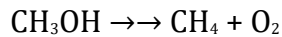
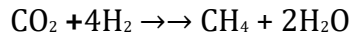
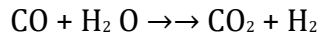
Ans. The gas produced by anaerobic fermentation of waste biomass is called BIOGAS. It consists of methane, CO₂ hydrogen, nitrogen, Oxygen, H₂ S etc. The microbes which are commonly used for Biogas production-

i) hydrolytic bacteria eg. *cellulomonas*, *clostridium*

ii) H₂ producing bacteria eg. *Syntrophomonas wolfei*

iii) Methanogenic bacteria eg. *Methanobacterium omelianskii*

The Biogas plant consists of concrete tank is fed. A floating cover is placed over slurry, which keeps on rising as the gas is produced in the tank due to microbial activity. The Biogas plant has an outlet which is connected to a pipe to supply biogas to nearby houses. During biogas production, microbes convert the organic fraction of biodegradable organic solid waste & refuse into energy in the form of biogas & humus.



8. Microbes can be used to decrease the use of chemical fertilizers & pesticides.

Explain how can this be accomplished?

Ans.. In modern society, the problems of plant diseases & pests are being tackled by use of chemicals but these chemicals are toxic & extremely harmful to human beings & environment. Thus in agriculture, there is a method of controlling pests that relies on natural predation rather than chemicals eg. In order to control butterfly, caterpillar etc, a bacteria called *Bacillus thuringiensis* (Bt) are available as dried spores in sachet which are mixed with water & sprayed onto vulnerable plants eg – brassica etc where these are eaten by insect larvae. In the gut of larvae, the toxin is released & larvae get killed. The bacterial disease will kill the caterpillar but leave other insects unharmed.

9. How do Biofertilisers enrich the fertility of soil? How does cyanobacteria act as biofertiliser?

Ans.. The Biological routes of improving soil fertility for optimum crop production are operated by micro-organisms & they are hence known as "BIOFERTILIZERS. These microorganisms increase crop productivity by either of the following methods

- i) By fixing atmospheric nitrogen
- ii) By solubilising insoluble fertilizers
- iii) By stimulating plant growth.
- iv) By phosphorus uptake.
- v) By bring about decomposition of plant residues.

Cyanobacteria eg. *Anabaena* which is found in the leaf cavity of water fern *Azolla*, fixes nitrogen from atmosphere & excretes nitrogenous compound into leaf cavity.

10. How does primary sludge differ from activated sludge? What type of changes in the sludge are carried out in anaerobic sludge digester? Give the composition of biogas produced in the sewage treatment plant.

Ans. Primary sludge is all solids like soil, small pebbles that settle down in settling tank during primary treatment of sewage. Activated sludge is the sediment of bacterial flocs in settling tank during biological treatment. Flocs are masses of bacteria held together by slime and fungal filaments. A part of activated sludge is used as inoculum in aeration tank and remaining is passed into a large tank called anaerobic sludge digester. In this tank, other kind of bacteria which grow anaerobically, digest the bacteria, fungi and biomass in the sludge. Biogas that produced in Sewage treatment plant is a mixture of methane, hydrogen and Carbon dioxide.