



Blue Print (As per PU Board)

Topic	1 mark questions	2 marks questions	3 marks questions	5 marks questions	Total Marks
Microbes In Human Welfare	3	-	3	2	22

One mark questions

1. **What are flocs?**

Answer: Flocs are masses of bacteria associated with fungal filaments to form mesh like structures during secondary treatment of sewage

2. **Give the scientific name of baker's yeast.**

Answer: *Saccharomyces cerevisiae*

3. **What is bio control?**

Answer: Bio control refers to the use of biological methods for controlling plant diseases and pests.

Two marks questions

4. **How does anabaena and mycorrhiza act as bio fertilizers?**

Answer: (a) Anabaena fix atmosphere nitrogen.

(b) Mycorrhiza absorbs phosphorous from soil and passes it to the plant.

5. **Name any two distilled and undistilled alcoholic beverages:**

Answer: (a) Distilled alcoholic beverages: Whisky, Rum, Brandy

(b) Undistilled alcoholic beverages: Beer and wine

6. **Name the microbe used for statin production. How do statin lower the blood cholesterol?**

Answer: A *Monascus purpureus* is used to produce statins. Statins lower the blood cholesterol level by competitively inhibiting the enzyme responsible for synthesis of cholesterol

7. **Write a note on microbes in antibiotic**

Answer: Antibiotics are chemical substances produced by certain microbes that kill or retard the growth of other microbes. (disease causing microbes). Penicillin is the first antibiotic discovered by Alexander Fleming.

He discovered it by chance when he was working on bacterium *staphylococcus*. He discovered that growth of *staphylococcus* ceases in the culture plates where *penicillium notatum* was grown later, its use as an effective antibiotic was established by chain and florey.

Three marks questions

8. **Explain the role of microbes as bio fertilizers.**

Answer: Bio-fertilizers are organisms that enrich the nutrient quality of the soil. Many bacteria, fungi and cyanobacteria acts as bio fertilizers

They act as bio fertilizers by living in symbiotic association with root nodules of leguminous plants such as *Rhizobium*. These bacteria fix atmospheric nitrogen and enrich the nitrogen content of soil. Fungi also form symbiotic associations with plants such as *glomus*. (Mycorrhizal association) They absorb phosphorous and pass it to plants cyanobacteria such as *nostoc*, *anabaena* etc also fix atmosphere nitrogen and act as biofertilizers especially in paddy fields.

9. **Explain role of microbes in biological control of pests and disease**

Answer: Bio-control of pests is a method of biological means of eradication of diseases causing pests. This requires a knowledge of the life forms i.e., predator and prey. That inhabit a particular area their lifecycles and pattern of feeding and preferred habits

Example: ladybirds and dragonflies are used to get rid of aphids and mosquitoes.



Microbes like *Bacillus thuringiensis* (Bt) is used to control butterfly caterpillars. Then bacterium is available in sachets as dried spores, which are sprayed on the crops. The spores get into the gut of the larvae and kill it while the other insects remain undisturbed.

By methods of genetic engineering the genes of *B. thuringiensis* responsible for killing the larvae have been incorporated into the plants. Cotton plant with Bt gene incorporated is called Bt-cotton

The fungus *Trichoderma* living in roots of plants acts as a bio control agent against several plant pathogens.

Five marks questions

10. Explain the role of microbes in the production of household products [Any five points - 5m]

Answer: (1) *Lactobacillus* and other bacteria commonly called Lactic acid bacteria (LAB) are used to convert milk into curd by fermentation

(2) Lactic acid bacteria also improve the nutritional quality of the curd with vitamin B_{12} and check disease causing microbes in our stomach

(3) The dough used for making dosa, idli is fermented by baker's yeast (*Saccharomyces cerevisiae*)

(4) Toddy made from sap of palm is fermented by bacteria.

(5) Microbes are also used in making different varieties of cheese

11. Explain the process of treatment of sewage

Answer: Sewage basically consists of human excreta. It may contain many microbes, which may be pathogenic also. Sewage disposal is a huge problem, it cannot be directly disposed into rivers and streams hence, it has to be treated first in sewage treatment (STPs)

The heterotrophic microbes present in the sewage itself and in its treatment

Sewage treatment includes two stages

1. Primary sewage treatment

2. Secondary sewage treatment

1. Primary sewage treatment: involves physical removal of particles by filtration and sedimentation. Initially, sequential filtration is used to remove floating debris. Then, grit (soil + small pebbles) are removed by sedimentation. Solids that settle down from the sludge while the supernatant from the effluent. Effluent is taken for secondary treatment.

2. Secondary sewage treatment:

➤ Effluent is passed into large aeration tanks where it undergoes continuous agitation mechanically.

➤ Air pumping into these tanks which allows rapid growth of microbial masses (masses of bacteria along with fungal filaments to form mesh like aggregates) called flocs.

➤ During microbial growth, bacter consume most of the organic matter. This reduces BOD, Biochemical oxygen demand of the effluent.

➤ BOD is the amount of oxygen consumed by the microbes in the decomposition of all the organic matter in one litre of water

➤ BOD is a measure of the organic pollutants in the waste water. BOD is directly proportional to the pollution rate.

➤ BOD tests the rate of uptake of oxygen by micro-organisms in a sample of water. Greater the BOD more the polluting potential

➤ After the reduction of BOD. The effluent is passed into a setting tank, where the bacterial flocks are allowed to sediment. This sediment is called activated sludge

➤ A small part of it is pumped into the aeration tank to serve as the inoculum. The remaining part of the sludge is pumped into the large tanks is called anaerobic sludge digesters

In anaerobic sludge digesters, anaerobic bacteria act on activated sludge to produce biogas (CH_4, CO_2, H_2S). The effluent from secondary treatment plant is released into water bodies.



12. Write a note on a typical biogas plant. How microbes help in production of biogas

Answer: Role of microbes in biogas production:

- Biogas is a mixture of gases produced by the microbial activity of methane producing bacteria collectively called methanogens.
- Methanobacterium is one such common methane producing bacteria found in the anaerobic sludge during sewage treatment.
- In the first stage anaerobic bacterium convert complex organic substances present in the biological wastes into simple molecules
- These molecules are degraded anaerobically to produce organic acids like acetic acids.
- Methanogens under anaerobic conditions convert acetic acid into methane and carbon dioxide.

