

QB365

Important Questions - Microbes in Human Welfare

12th Standard CBSE

Biology

Reg.No. :

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Time : 01:00:00 Hrs

Total Marks : 50

Section - A

- 1) Bio fertilisers include: 1
- (a) Blue-green algae, rhizobia, other nitrogen fixing bacteria and mycorrhiza fungi
(b) Blue-green algae, rhizobia and other nitrogen fixings bacteria
(c) Rhizobia, other nitrogen fixing bacteria and mycorrhiza fungi
(d) Blue green algae, rhizobia and mycorrhiza fungi
- 2) Probiotics are 1
- (a) Cancer inducing microbes (b) New kind of food allergens (c) Live microbial food supplement
(d) Safe antibiotics
- 3) Nitrogen fixation in root nodules of Alnus is brought about by 1
- (a) Frankia (b) Azorhizobium (c) Bradyrhizobium (d) Clostridium
- 4) In fermentation of dough which is the main gas produced? 1
- (a) Carbon dioxide (b) Hydrogen (c) Both (a) and (b) (d) Methane
- 5) Which of the following is not concerned with biotechnology? 1
- (a) Biogas production (b) Sewage treatment (c) Biofertilizers (d) Wood seasoning
- 6) Match the items in column 'A' and column 'B' and choose correct answer 1
- | Column 'A' | Column 'B' |
|--------------------------|----------------------|
| (i) Lady bird | (a) Methanobacterium |
| (ii) Mycorrhiza | (b) Trichoderma |
| (iii) Biological control | (c) Aphids |
| (iv) Bio-gas | (d) Glomus |
- (a) (i)-(b), (ii)-(d), (iii)-(c), (iv)-(a) (b) (i)-(c), (ii)-(d), (iii)-(b), (iv)-(a) (c) (i)-(d), (ii)-(a), (iii)-(b), (iv)-(c)
(d) (i)-(c), (ii)-(b), (iii)-(a), (iv)-(d)
- 7) An example of endomycorrhiza is 1
- (a) Nostoc (b) Glomus (c) Agaricus (d) Rhizobium
- 8) The purpose of biological treatment of waste water is to 1
- (a) reduce BOD (b) increase BOD (c) reduce sedimentation (d) increase sedimentation
- 9) Rotenone is a 1
- (a) bioherbicide (b) commonly used biofertilizer (c) bioinsecticide (d) juvenile hormone

- 10) Which one of the following is wrong matching of a microbe and its industrial product, while the remaining three are correct? 1
- (a) yeast - statins (b) Acetobacter aceti - acetic acid (c) Clostridium butylicum - lactic acid
(d) Aspergillus niger - citric acid

Section - B

- 11) How does 'starter' added to milk help it set into curd? 2
- 12) List four advantages that a symbiotic mycorrhizal association provides to the host plant. 2
- 13) During the secondary treatment of primary effluents, how does a significant decrease in BOD occur? 2
- 14) Do you think microbes can also be used as a source of energy? If yes, how? 2
- 15) Name any two varieties of cheese and mention the names of the microbes used. 2
- 16) What are methanogens? Name an example. 2
- 17) How do bioactive molecules of fungal origin help in restoring good health of humans? 2
- 18) List two major products obtained by use of microbes at commercial level. 2
- 19) The production of antibiotics led to an improved capacity in treating deadly diseases like a whooping cough, leprosy, etc But unnecessary use of antibiotics causes antibiotic resistance in microorganisms. 2
- (i) Which mechanism of evolution is shown by microorganisms?
(ii) Who demonstrated the genetic basis of drug resistant mutation in bacteria?
(iii) State another example of such mechanism of evolution.
- 20) (a) How is activated sludge formed during sewage treatment? (b) This sludge can be used as an inoculum or as source of biogas. Explain 2

Section - C

- 21) Arrange the following in the decreasing order (most important first) of their importance, for the welfare of human society. Give reasons for your answer. Biogas, citric acid, Penicillin and curd. 5
- 22) What are biofertilisers? Name the categories of used as biofertilisers with an example for each. How do they function in organic farming? 5
- 23) Explain biological control of pests and plant pathogens with examples. 5
- 24) Ramesh is a small scale farmer and holds 2.5 acres of land. He would like to increase the yield in his farm. Rahul, a student of MSc. (Agriculture) advised him to go to the agricultural department centre of his locality to get biofertilisers according to the variety of the crop. He also suggested Ramesh to stop the use of chemical fertilisers. 5
- (i) Explain the term biofertilisers.
(ii) Name the biofertiliser that is used mostly in paddy fields.
(iii) What are the values shown by Rahul?

Section - A

- 1) (a) Blue-green algae, rhizobia, other nitrogen fixing bacteria and mycorrhiza fungi 1
- 2) (c) Live microbial food supplement 1

- 3) (a) Frankia 1
- 4) (a) Carbon dioxide 1
- 5) (d) Wood seasoning 1
- 6) (b) (i)-(c), (ii)-(d), (iii)-(b), (iv)-(a) 1
- 7) (b) Glomus 1
- 8) (a) reduce BOD 1
- 9) (c) bioinsecticide 1
- 10) (c) Clostridium butylicum - lactic acid 1

Section - B

- 11) 2
- The small amount of curd added to the milk contains millions of lactic acid bacteria they start multiplying at the suitable temperatures.
 - LAB produce acids that coagulate and partially digest the milk proteins; thus, milk is converted into curd.
 - Vitamin B₁₂ content is increased
- 12) 2
- The fungus absorbs phosphorus from the soil and passes it to the plant. - Plants with mycorrhiza show resistance to root-borne pathogens. - They have an overall increased tolerance to salinity and drought. - There is an overall increase in plant growth and development.
- 13) 2
- During secondary treatment, the aeration allows vigorous growth of useful aerobic microbes into flocs, i.e. masses of bacterial cells in association with fungal filaments, forming mesh-like structures. - As they grow the microbes consume a major part of the organic matter in the effluent; so BOD is significantly reduced.
- 14) 2
- Yes, microbes can be used to produce energy. - The biogas production involves methanogens like methanobacterium which produces methane.
- 15) Swiss cheese - Propionibacterium. Roquefort cheese - A specific fungus. 2
- 16) 2
- Methanogens are those bacteria, which produce large quantities of methane during the decomposition of organic matter, e.g. Methanobacterium.

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Following are the bioactive molecules of fungal origin:

Bioactive Molecule	Fungal Source	Function
(i) Cyclosporin-A	Trichoderma polysporum	Used as an immunosuppressant during organ transplantation.
(ii) Vitamin- B_2	Ashbya gossipii	Proper functioning of neurons of the nervous system.
Statin	Yeast Monascus purpureus	Lowers the cholesterol level in the blood.

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In industry, microbes are used to produce a number of products valuable to human beings. Beverages and antibiotics are some examples. Production on an industrial scale requires growing microbes in very large vessels called fermentors.

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- (i) Natural selection due to mutation
- (ii) Joshua Lederberg and Esther Lederberg in 1952 conducted the replica plating experiment to demonstrate the genetic basis of drug resistant mutation in bacteria.
- (iii) Resistance developed by mosquitoes for various insect repellents.

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(a) Formation of activated sludge:

- The primary effluent is passed into large aeration tanks; it is constantly agitated and air is pumped into it.
- Consequently, the useful aerobic microbes grow vigorously and form flocs, which are masses of bacteria associated with fungal hyphae.
- These microbes consume sufficient quantities of the organic matter and thereby reduce the biological oxygen demand (BOD).
- Once the BOD is reduced, the effluent is passed into settling tanks, where the flocs sediment to form activated sludge.

(b) A small amount of activated sludge that is pumped back into the aeration tank, grow into flocs and consume the organic matter to reduce BOD.

When the activated sludge is pumped into anaerobic sludge digesters, the anaerobic bacteria digest the bacteria and fungi of the flocs; during this process gases like methane, hydrogen sulphide and carbon dioxide are formed, which constitute the biogas.

Section - C

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- (i) Curd is a common food item that supplies nutrients like calcium, vitamin, A, B phosphorus, etc
- (ii) Biogas is used as energy source
- (iii) Penicillin is an antibiotic, used to control several diseases.
- (iv) Citric acid is used as a preservative in fruit juices, squashes, etc.

22) Biofertilisers are those organisms which enrich the soil fertility.

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Categories of organisms:

- (i) Bacteria, e.g. Rhizobium, Azotobacter
- (ii) Cyanobacteria, e.g. Nostoc, Aulosira
- (iii) Mycorrhizae/fungi, e.g. Glomus

Functions:

- Bacteria and Cyanobacteria fix atmospheric nitrogen and increase the nitrogen content of the soil.
- Cyanobacteria also add organic matter to the soil through their photosynthesis.
- The fungi decompose the organic matter of the soil and make the nutrients available to the roots.
- Mycorrhizae help in absorption and storage of some mineral nutrients like phosphorus for the plants.

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1. The very familiar beetle with red and black markings- the Ladybird, and Dragonflies are useful to get rid of aphids and mosquitoes, respectively.

2. Role of Bacillus thuringiensis.

(i) But coming to microbial biocontrol agents, that can be introduced in order to control butterfly caterpillars is the bacteria Bacillus thuringiensis (often 'Written as Bt.)

(ii) These are available in sachets of dried spores which are mixed with water and sprayed onto vulnerable plants such as brassicas and fruit trees, where these are eaten by the insect larvae.

(iii) In the gut of the larvae, the toxin is released and the larvae get killed.

(iv) The bacterial disease will kill the caterpillars, but leave other insects unharmed.

(v) Because of the development of the methods of genetic engineering in the last decade or so, the scientists have introduced B. thuringiensis toxin genes into plants.

(vi) Such plants are resistant to attack by insect pests. Bt.-cotton is one such example which is being cultivated in some states of our country.

3. Biological control of Plant pathogens. A biological control developed for use in the treatment of plant disease is the fungus Trichoderma. Trichoderma spp. are free living fungi that are very common in soil and root ecosystems. They are effective biocontrol agents of several plant pathogens.

4. Baculoviruses are pathogens that attack insects and other arthropods. The majority of baculoviruses used as biological control agents are in the genus Nucleopolyhedrovirus. These viruses are excellent candidates for species-specific, narrow spectrum insecticidal applications. They have been shown to have no negative impacts on plants, mammals, birds, fish, or even on non-target insects. This is especially desirable when beneficial insects are being conserved to aid in an overall IPM (Integrated Pest Management) programme, or when an ecologically sensitive area is being treated.

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(ii) Cyanobacteria

(iii) Rahul is helpful in nature. He uses his knowledge for the benefit of society. Moreover, he is concerned to protect the environment from pollution as he discouraged the use of chemical fertilisers.