

BIOLOGY



Important Questions

➤ Multiple Choice Questions:

- The vitamin whose content increases following the conversion of milk into curd by lactic acid bacteria is:
 - Vitamin C
 - Vitamin D
 - Vitamin B12
 - Vitamin E.
- Waste water treatment generates a large quantity of sludge, which can be treated by:
 - digesters
 - activated sludge
 - chemicals
 - oxidation pond.
- Methanogenic bacteria are not found in:
 - rumen of cattle
 - gobar gas plant
 - bottom of water logged paddy fields
 - activated sludge.
- The primary treatment of waste water involves the removal of:
 - dissolved impurities
 - stable particles
 - toxic substances
 - harmful bacteria.
- BOD of waste water is estimated by measuring the amount of:
 - total organic matter
 - biodegradable organic matter
 - oxygen evolution
 - oxygen consumption.
- Which one of the following alcoholic drinks is produced without distillation?
 - Wine
 - Whisky
 - Rum
 - Brandy.
- The technology of biogas production from cow dung was developed in India largely due to

the efforts of:

- (a) Gas Authority of India
- (b) Oil and Natural Gas Commission
- (c) Indian Agricultural Research Institute and Khadi & Village Industries Commission
- (d) Indian Oil Corporation.

8. The free-living fungus *Trichoderma* can be used for:

- (a) killing insects
- (b) biological control of plant diseases
- (c) controlling butterfly caterpillars
- (d) producing antibiotics.

9. What would happen if oxygen availability to activated sludge flocs is reduced?

- (a) It will slowdown the rate of degradation of organic matter.
- (b) The centre of flocs will become anoxic, which would cause death of bacteria and eventually breakage of flocs.
- (c) Flocs would increase in size as anaerobic bacteria would grow around flocs.
- (d) Protozoa would grow in large numbers.

10. Mycorrhiza does not help the host plant in:

- (a) Enhancing its phosphorus uptake capacity
- (b) Increasing its tolerance to drought
- (c) Enhancing its resistance to root pathogens
- (d) Increasing its resistance to insects.

11. Which one of the following is not a nitrogen-fixing organism?

- (a) *Anabaem*
- (b) *Nostoc*
- (c) *Azotobacter*
- (d) *Pseudomonas*.

12. Big holes in Swiss cheese are made by a:

- (a) machine
- (b) bacterium that produces methane gas
- (c) bacterium producing a large amount of carbon dioxide
- (d) fungus that releases a lot of gases during its metabolic activities.

13. The residue left after methane production from cattle dung is:

- (a) burnt
- (b) buried in land-fills
- (c) used as manure

(d) used in civil construction.

14. Methanogens do not produce:

- (a) oxygen
- (b) methane
- (c) hydrogen sulphide
- (d) carbon dioxide.

15. Activated sludge should have the ability to settle quickly so that it can:

- (a) be rapidly pumped back from sedimentation tank to aeration tank
- (b) absorb pathogenic bacteria present in waste water while sinking to the bottom of the settling tank
- (c) be discarded and anaerobically digested
- (d) absorb colloidal organic matter

➤ **Very Short Question:**

1. How does a small amount of curd added to fresh milk convert it into curd? Mention a nutritional quality that gets added to the curd.
2. Why is secondary treatment of water in sewage treatment plant called biological treatment?
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.
4. You have observed that fruit juice in bottles bought from the market are clearer as compared to those made at home. Give reason.
5. Alexander Fleming discovered Penicillin, but its full potential as an effective antibiotic was established by other scientists. Name the two scientists.
6. Name the plant whose sap is used in making 'Toddy'. Mention the process involved in it.
7. What is the medical use of cyclosporin A.
8. Name the pests that lady bird & dragon flies help to get rid of respectively?
9. Give an example to prove that microbes release gases during metabolism?
10. What are interferons?

➤ **Short Questions:**

1. Expand the 'LAB'. How are LABs beneficial to humans?
2. What is cyclosporin A? What is its importance?
3. How do antibiotics act?
4. Write the various steps of fermentation.

5. What are the two ways by which micro-organisms can be grown in bioreactors?
6. What is sewage? In which way can this be harmful?
7. What is the key difference between primary and secondary sewage treatment?
8. Draw a simple diagram to show an anaerobic sludge digester.

➤ Long Questions:

1. Give examples to prove that microbes release gases during metabolism.
2. What are Baculo viruses? Write their significance.
3. List the events that lead to the production of biogas from wastewater whose BOD has been reduced significantly.

➤ Assertion and Reason Questions:

1. Two statements are given-one labelled Assertion and the other labelled Reason. Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.
 - a) Both assertion and reason are true and reason is the correct explanation of assertion.
 - b) Both assertion and reason are true but reason is not the correct explanation of assertion.
 - c) Assertion is true but reason is false.
 - d) Both assertion and reason are false.

Assertion: Champagne gives off bubbles.

Reason: Alcoholic content is 12-16% in champagne.

2. Two statements are given-one labelled Assertion and the other labelled Reason. Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.
 - a) Both assertion and reason are true and reason is the correct explanation of assertion.
 - b) Both assertion and reason are true but reason is not the correct explanation of assertion.
 - c) Assertion is true but reason is false.
 - d) Both assertion and reason are false.

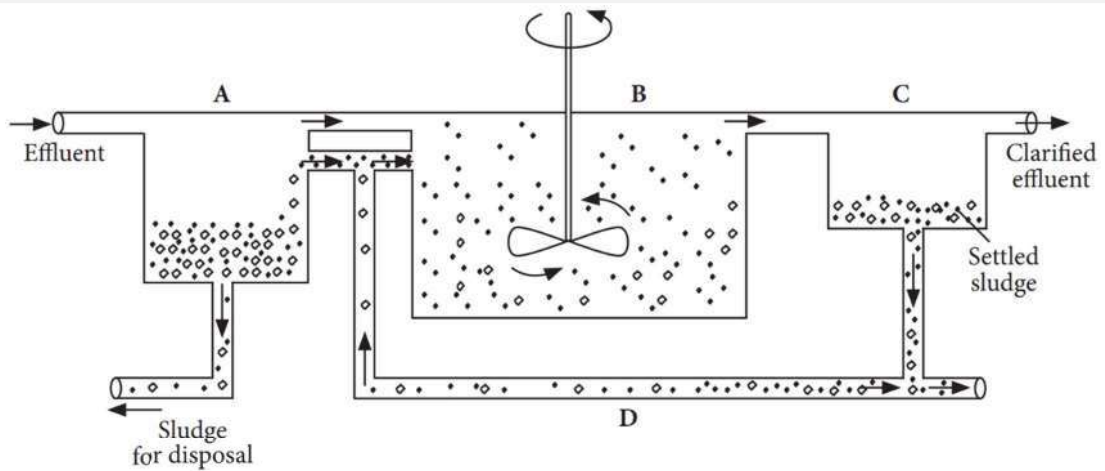
Assertion: The alcoholic content of fortified wines are high.

Reason: The fermentation is stopped before all the sugars are being converted.

➤ Case Study Questions:

1. Read the following and answer any four questions from (i) to (v) given below:

Saurin, a M.Sc student, get an assignment on sewage treatment plant (STP) to study the microbial load. After visiting such plant in his locality, he makes a simplified diagram of the STP for his project. Study the diagram given below and answer the following questions.



(i) In the diagram 'A' denotes:

- Aeration tank.
- Primary settling tank.
- Secondary settling tank.
- Sludge digester.

(ii) Which of the following is incorrect regarding the sludge released from A?

- It is formed after primary treatment.
- It does not require aeration.
- It possesses flocs of decomposer microbes.
- It is used in landfills.

(iii) A large number of aerobic heterotrophic microbes grow in:

- A
- B
- C
- Both (a) and (b).

(iv) What is denoted by 'D' in the given diagram?

- Primary sludge.
- Primary effluent.
- Activated sludge.
- Secondary effluent.

(v) Assertion: The colloided and finely suspended matter of sewage form aggregates which are called flocs.

Reason: Flocs contain masses of bacteria, slime and fungal filaments.

- Both assertion and reason are true and reason is the correct explanation of assertion.
- Both assertion and reason are true but reason is not the correct explanation of assertion.
- Assertion is true but reason is false.

d. Both assertion and reason are false.

2. Read the following and answer any four questions from (i) to (v) given below:

Green manuring is the fanning practice where a leguminous plant which has derived enough benefits from its association with appropriate species of Rhizobium, is ploughed into the field soil and then a non-legume is sown and allowed to get benefitted from the already present nitrogen fixer. Some legumes, such as, *Crotolaria juncea*, *Sesbania rostrata*, *Lencaena leucocephala*, etc. are used as green manure. Rhizobia, that fix atmospheric nitrogen in the form of nitrate, live in the roots of leguminous plants. These nutrients are used by non-leguminous plants through the practice of green manuring.

(i) Green manures mainly provide nutrient enriched in:

- a. Magnesium.
- b. Sulphur.
- c. Nitrogen.
- d. Both (a) and (b).

(ii) Which of the following plants is used as green manure in crop fields?

- a. *Saccharum*.
- b. *Dichanthium*.
- c. *Phyllonthus*.
- d. *Crotolaria*.

(iii) Green manure plants belong to the Family:

- a. Lamiaceae.
- b. Papilionaceae.
- c. Liliaceae.
- d. Poaceae.

(iv) Due to excess use of chemical fertilisers rich in nitrate, _____ disease occurred in children.

- a. Jaundice.
- b. Septicemia.
- c. Methemoglobinemia.
- d. Botulism.

(v) A green manure is:

- a. Rice.
- b. Maize.
- c. Sorghum.
- d. *Sesbania*.

✓ Answer Key-

➤ Multiple Choice Answers:

1. (c) Vitamin B12
2. (d) oxidation pond.
3. (d) activated sludge.
4. (b) stable particles
5. (d) oxygen consumption.
6. (a) Wine
7. (c) Indian Agricultural Research Institute and Khadi & Village Industries Commission
8. (b) biological control of plant diseases
9. (b) The centre of flocs will become anoxic, which would cause death of bacteria and eventually breakage of flocs.
10. (d) Increasing its resistance to insects.
11. (d) Pseudomonas.
12. (c) bacterium producing a large amount of carbon dioxide
13. (c) used as manure
14. (a) oxygen
15. (a) be rapidly pumped back from sedimentation tank to aeration tank

➤ Very Short Answers:

1. 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. In this treatment Organic wastes of sewage water are decomposed by certain microorganisms in presence of water.
3. Penicillin, Alexander Fleming.
4. Bottle juices are clarified by the use of pectinase and proteases.
5. Ernest chain and Howard Florey.
6. Palm tree, by fermentation.
7. Cyclosporin A is used as an immunosuppressive drug during organ transplantation.
8. Lady bird beetle is useful to get rid off aphids & dragon – flies control mosquitoes.
9. The best example of microbes release gases during metabolism are the puffed dough & bread.

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

➤ Short Answer:

1. LAB-Lactic Acid Bacteria Benefits:

- Found in curd. They improve the nutritional quality of food.
- Yogurt is prepared from milk by *Lactobacillus Bulgaricus*.

2. Cyclosporin A. It is an eleven-membered cyclic oligopeptide obtained through the fermentative activity of fungus *Trichoderma Polysporum*.

Importance. It has antifungal, anti-inflammatory, and immunosuppressive properties. It inhibits the activation of T-cells and therefore, prevents rejection reactions in organ transplantation.

3. Antibiotics do not have identical effects on all harmful microbes. All of them inhibit growth or destroy bacteria, viruses, and fungi. Actually, antibiotic molecules should disrupt a vital link in the microbe's metabolism and this link is their target or point of impact.

4. The major steps of fermentation are:

- i. Sterilization of the fermenter and medium in steam. It is carried out under pressure and high temperature.
- ii. Inoculation of a selected strain of the yeast.
- iii. Recovery of the product.

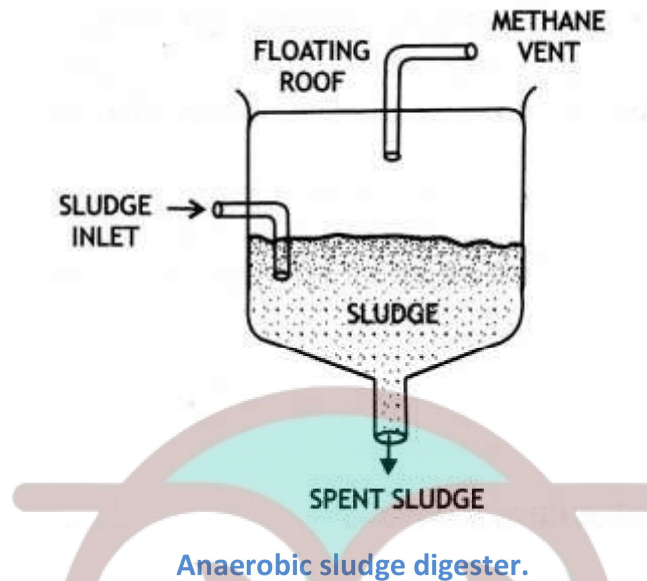
5. Micro-organisms can be grown in the bioreactors in two ways:

- i. As a layer or film on the surface of the nutrient medium. It is known as a support growth system.
- ii. By suspending cells or mycelia in a liquid medium contained in the growth vessel. It is known as a suspended growth system.

6. Sewage is used and wastewater consisting of human excreta, wash waters, industrial and agricultural wastes that enter the sewage system. In general, sewage contains 95.5% water and 0.1 to 0.5% organic and inorganic matter. They are very harmful to us due to the presence of a variety of micro-organisms in them, most of which are highly pathogenic. Sewage has a high BOD value, which develops anaerobic conditions in water resulting in the death of water animals and emitting foul smell due to incomplete oxidation of organic materials in the sewage.

7. Primary treatment of wastes is the screening and removal of insoluble particulate materials, by addition of alum and other coagulants. It is the physical removal of 20-30% of organic materials present in sewage in particulate form. Secondary treatment of waste is the biological removal of dissolved organic matter through trickling filters, activated sludge, lagoons, extended aeration systems, and anaerobic digestors.

8. Answer:



➤ Long Answer:

1.

- i. Large holes in 'Swiss Cheese' are due to the production of a large amount of CO₂ by a bacterium named *Propionibacterium shamanic*.
- ii. The puffed-up appearance of dough is due to the production of CO₂ gas by yeast, *Saccharomyces cerevisiae*.
- iii. Methane, H₂S, and CO₂ are produced during microbial digestion of organic compounds in the case of secondary treatment of sewage.
- iv. The dung of the cattle produces methane gas in the biogas plants.

2. Baculoviruses are those viruses, which attack insects and other arthropods, e.g. Nucleopolyhedrovirus.

Significance:

- Baculoviruses are species-specific and narrow-spectrum insecticides.
- They have no negative impacts on plants, birds, mammals, or even other non-target insects.
- The desirable aspect in conservation of beneficial insects in overall integrated pest management (IPM) program as in an ecologically sensitive area.

3.

- i. During secondary treatment of wastewater, sewage fungus forms flocs.
- ii. BOD decreases. As it decreases to 10-15% of original sewage, the wastewater is taken to a large settling tank where the flocs of sewage fungus settle down.

- iii. The supernatant can be passed into water bodies or treated further.
- iv. The organic sediment is passed into an anaerobic sludge digester where anaerobic microbes methanogens decompose organic matter.
- v. It is accompanied by the production of biogas and the formation of manure or compost.

➤ Assertion and Reason Answers:

1. (b) Both assertion and reason are true but reason is not the correct explanation of assertion.

Solution:

Champagne wines are bottled before fermentation is complete. These wines give off bubbles of gas. Alcohol content is 12-16%.

2. (b) Both assertion and reason are true but reason is not the correct explanation of assertion.

Solution:

In fortified wines, the fermentation is stopped before all the sugar is being converted and at least 1 percent is still present. The still wines have a higher alcoholic content due to the addition of wine, brandy or alcohol.

➤ Case Study Answers:

1.

- (i) (b) Primary settling tank.

Explanation:

In the given diagram, A-primary settling tank, B-aeration tank, C-secondary settling tank.

- (ii) (c) It possesses flocs of decomposer microbes.

Explanation:

Primary sludge does not possess flocs of decomposer microbes. These are formed during secondary treatment.

- (iii) (b) B

Explanation:

A large number of aerobic heterotrophic microbes grow in the aeration tank (B).

- (iv) (c) Activated sludge.

- (v) (b) Both assertion and reason are true but reason is not the correct explanation of assertion.

2.

- (i) (c) Nitrogen.
(ii) (d) Crotonaria.

Explanation:

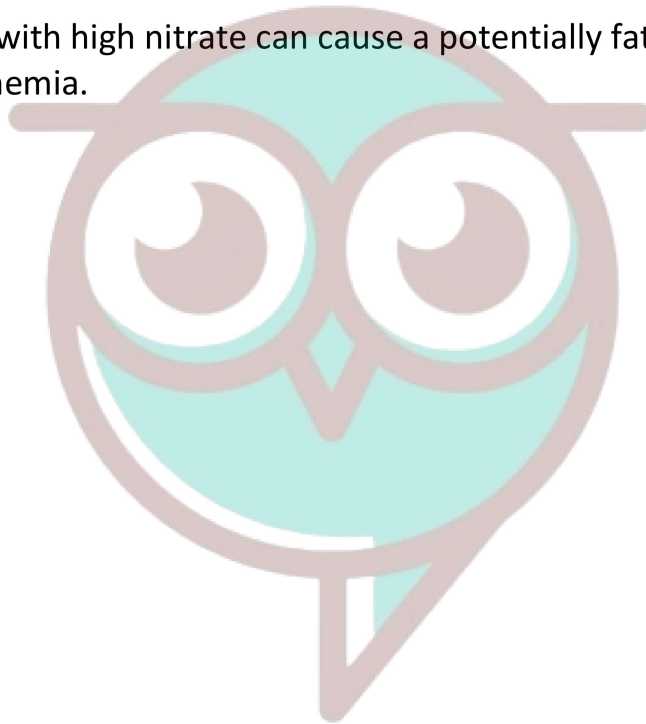
Some legumes such as Crotonaria juncea, Sesbania rostrata, Lencena leucocephala, etc. are used as green manure.

- (iii) (b) Papilionaceae.
(iv) (c) Methemoglobinemia.

Explanation:

Drinking water with high nitrate can cause a potentially fatal disorder called methemoglobinemia.

- (v) (d) Sesbania.



Swotters