

Microbes in Human Welfare — NEET Biology PYQ (2005-2021)

Class 12 Biology · 49 real NEET & AIPMT questions, year-tagged · answers checked by RankUp

NEET 2021

1. Match List - I with List - II.

List - I | List - II

(a) *Aspergillus niger* | (i) Acetic Acid

(b) *Acetobacter aceti* | (ii) Lactic Acid

(c) *Clostridium butylicum* | (iii) Citric Acid

(d) *Lactobacillus* | (iv) Butyric Acid

Choose the correct answer from the options given below.

(A) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

(B) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

(C) (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)

(D) (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)

NEET 2020 · Q23

2. Which of the following is put into Anaerobic sludge digester for further sewage treatment?

(A) Primary sludge

(B) Floating debris

(C) Effluents of primary treatment

(D) Activated sludge

NEET 2020 · Q48

3. Match the following columns and select the correct option.

Column - I | Column - II

(a) *Clostridium butylicum* | (i) Cyclosporin-A

(b) *Trichoderma polysporum* | (ii) Butyric Acid

(c) *Monascus purpureus* | (iii) Citric Acid

(d) *Aspergillus niger* | (iv) Blood cholesterol lowering agent

(A) (a)-iii, (b)-iv, (c)-ii, (d)-i

(B) (a)-ii, (b)-i, (c)-iv, (d)-iii

(C) (a)-i, (b)-ii, (c)-iv, (d)-iii

(D) (a)-iv, (b)-iii, (c)-ii, (d)-i

NEET 2019 · Q96

4. Which of the following is a commercial blood cholesterol lowering agent ?

(A) Cyclosporin A

(B) Statin

(C) Streptokinase

(D) Lipases

NEET 2019 · Q123

5. Select the correct group of biocontrol agents.

(A) *Bacillus thuringiensis*, Tobacco mosaic virus, Aphids

(B) *Trichoderma*, Baculovirus, *Bacillus thuringiensis*

(C) *Oscillatoria*, *Rhizobium*, *Trichoderma*

(D) *Nostoc*, *Azospirillum*, Nucleopolyhedrovirus

NEET 2019 · Q125

6. Match the following organisms with the products they produce :

- (a) Lactobacillus — (i) Cheese**
- (b) Saccharomyces cerevisiae — (ii) Curd**
- (c) Aspergillus niger — (iii) Citric Acid**
- (d) Acetobacter aceti — (iv) Bread**
- (v) Acetic Acid**

Select the correct option.

- (A) (a)-(ii), (b)-(iv), (c)-(v), (d)-(iii)
- (B) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(v)
- (C) (a)-(iii), (b)-(iv), (c)-(v), (d)-(i)
- (D) (a)-(ii), (b)-(i), (c)-(iii), (d)-(v)

NEET 2019 · Q169

7. Which of the following can be used as a biocontrol agent in the treatment of plant disease ?

- (A) Trichoderma
- (B) Chlorella
- (C) Anabaena
- (D) Lactobacillus

NEET 2018 · Q178

8. Conversion of milk to curd improves its nutritional value by increasing the amount of

- (A) Vitamin B₁₂
- (B) Vitamin A
- (C) Vitamin D
- (D) Vitamin E

NEET 2017 · Q46

9. Which of the following in sewage treatment removes suspended solids?

- (A) Tertiary treatment
- (B) Secondary treatment
- (C) Primary treatment
- (D) Sludge treatment

NEET 2017 · Q123

10. Select the mismatch:

- (A) Frankia - Alnus
- (B) Rhodospirillum - Mycorrhiza
- (C) Anabaena - Nitrogen fixer
- (D) Rhizobium - Alfalfa

NEET 2016 Phase 1 · Q169

11. Which of the following is wrongly matched in the given table?

- (A) Trichoderma polysporum - Cyclosporin A - immunosuppressive drug
- (B) Monascus purpureus - Statins - lowering of blood cholesterol
- (C) Streptococcus - Streptokinase - removal of clot from blood vessel
- (D) Clostridium butylicum - Lipase - removal of oil stains

NEET 2016 Phase 1 · Q177

12. The primitive prokaryotes responsible for the production of biogas from the dung of ruminant animals, include the:

- (A) Halophiles
- (B) Thermoacidophiles
- (C) Methanogens
- (D) Eubacteria

AIPMT 2015

13. The guts of cow and buffalo possess:

- (A) Cyanobacteria
- (B) Fucus spp.
- (C) Chlorella spp.
- (D) Methanogens

AIPMT 2014

14. What gases are produced in anaerobic sludge digesters?

- (A) Methane, Hydrogen Sulphide and CO₂
- (B) Methane, Hydrogen Sulphide and O₂
- (C) Hydrogen Sulphide and CO₂
- (D) Methane and CO₂ only

NEET 2013

15. A good producer of citric acid is

- (A) Aspergillus
- (B) Pseudomonas
- (C) Clostridium
- (D) Saccharomyces

NEET 2013

16. During sewage treatment, biogases are produced which include

- (A) methane, hydrogen sulphide, carbon dioxide
- (B) methane, oxygen, hydrogen sulphide
- (C) hydrogen sulphide, methane, sulphur dioxide
- (D) hydrogen sulphide, nitrogen, methane

AIPMT 2012 Mains

17. In gobar gas, the maximum amount is that of

- (A) Butane
- (B) Methane
- (C) Propane
- (D) Carbon dioxide

AIPMT 2012 Prelims

18. A patient brought to a hospital with myocardial infarction is normally immediately given

- (A) Statins
- (B) Penicillin
- (C) Streptokinase
- (D) Cyclosporin-A

AIPMT 2012 Prelims

19. Measuring Biochemical Oxygen Demand (BOD) is a method used for

- (A) Working out the efficiency of RBCs about their capacity to carry oxygen
- (B) Estimating the amount of organic matter in sewage water
- (C) Working out the efficiency of oil driven automobile engines
- (D) Measuring the activity of Saccharomyces cerevisiae in producing curd on a commercial scale

AIPMT 2012 Prelims

20. Yeast is used in the production of

- (A) Cheese and butter
- (B) Citric acid and lactic acid
- (C) Lipase and pectinase
- (D) Bread and beer

AIPMT 2012 Prelims

21. Which one of the following is an example of carrying out biological control of pests/diseases using microbes ?

- (A) Lady bird beetle against aphids in mustard
- (B) Trichoderma sp. against certain plant pathogens
- (C) Nucleopolyhedrovirus against white rust in Brassica
- (D) Bt-cotton to increase cotton yield

AIPMT 2012 Prelims

22. A nitrogen-fixing microbe associated with Azolla in rice fields is

- (A) Tolypothrix
- (B) Spirulina
- (C) Anabaena
- (D) Frankia

AIPMT 2012 Prelims

23. Which one of the following microbes forms symbiotic association with plants and helps them in their nutrition ?

- (A) Trichoderma
- (B) Azotobacter
- (C) Aspergillus
- (D) Glomus

AIPMT 2012 Prelims

24. Monascus purpureus is a yeast used commercially in the production of

- (A) Blood cholesterol lowering statins
- (B) Ethanol
- (C) Streptokinase for removing clots from the blood vessels
- (D) Citric acid

AIPMT 2011 Mains

25. Read the following statement having two blanks (A and B): "A drug used for ___(A)___ patients is obtained from a species of the organism ___(B)___." The one correct option for the two blanks is

- (A) A: Swine flu, B: Monascus
- (B) A: AIDS, B: Pseudomonas
- (C) A: Heart, B: Penicillium
- (D) A: Organ-transplant, B: Trichoderma

AIPMT 2011 Mains

26. Which one of the following is a wrong matching of a microbe and its industrial product, while the remaining three are correct?

- (A) Clostridium butylicum - lactic acid
- (B) Aspergillus niger - citric acid
- (C) Yeast - statins
- (D) Acetobacter aceti - acetic acid

AIPMT 2011 Prelims

27. Secondary sewage treatment is mainly a

- (A) Biological process
- (B) Physical process
- (C) Mechanical process
- (D) Chemical process

AIPMT 2011 Prelims

28. Which one of the following is not a biofertilizer?

- (A) Mycorrhiza
- (B) Agrobacterium
- (C) Rhizobium
- (D) Nostoc

AIPMT 2011 Prelims

29. Which one of the following helps in absorption of phosphorus from soil by plants?

- (A) Anabaena
- (B) Glomus
- (C) Rhizobium
- (D) Frankia

AIPMT 2011 Prelims

30. Which of the following is mainly produced by the activity of anaerobic bacteria on sewage?

- (A) Marsh gas
- (B) Laughing gas
- (C) Propane
- (D) Mustard gas

AIPMT 2011 Prelims

31. Ethanol is commercially produced through a particular species of

- (A) Aspergillus
- (B) Saccharomyces
- (C) Clostridium
- (D) Trichoderma

AIPMT 2011 Prelims

32. The most common substrate used in distilleries for the production of ethanol is

- (A) Molasses
- (B) Corn meal
- (C) Soya meal
- (D) Ground gram

AIPMT 2011 Prelims

33. An organism used as biofertilizer for raising soyabean crop is

- (A) Nostoc
- (B) Azotobacter
- (C) Azospirillum
- (D) Rhizobium

AIPMT 2010 Mains · Q28

34. An example of endomycorrhiza is

- (A) Nostoc
- (B) Glomus
- (C) Agaricus
- (D) Rhizobium

AIPMT 2010 Prelims · Q175

35. Select the correct statement from the following

- (A) Activated sludge-sediment in settlement tanks of sewage treatment plant is a rich source of aerobic bacteria
- (B) Biogas is produced by the activity of aerobic bacteria on animal waste
- (C) Methanobacterium is an aerobic bacterium found in rumen of cattle
- (D) Biogas, commonly called gobar gas, is pure methane

AIPMT 2010 Prelims · Q182

36. Which one of the following is not used in organic farming?

- (A) Snail
- (B) Glomus
- (C) Earthworm
- (D) Oscillatoria

AIPMT 2010 Prelims · Q183

37. A common biocontrol agent for the control of plant diseases is

- (A) Trichoderma
- (B) Baculovirus
- (C) Bacillus thuringiensis
- (D) Glomus

AIPMT 2009 Prelims · Q74

38. Biochemical Oxygen Demand (BOD) in a river water:

- (A) has no relationship with concentration of oxygen in the water.
- (B) gives a measure of salmonella in the water.
- (C) increases when sewage gets mixed with river water.
- (D) remains unchanged when algal bloom occurs.

AIPMT 2009 Prelims · Q114

39. Which one of the following pairs is wrongly matched?

- (A) Alcohol – nitrogenase
- (B) Fruit juice – pectinase
- (C) Textile – amylase
- (D) Detergents – lipase

AIPMT 2009 Prelims · Q115

40. Which of the following is not used as a biopesticide?

- (A) Trichoderma harzianum
- (B) Nuclear Polyhedrosis Virus (NPV)
- (C) Xanthomonas campestris
- (D) Bacillus thuringiensis

AIPMT 2009 Prelims · Q141

41. Which of the following is a symbiotic nitrogen fixer?

- (A) Azotobacter
- (B) Frankia
- (C) Azolla
- (D) Glomus

AIPMT 2009 Prelims · Q145

42. The bacterium Bacillus thuringiensis is widely used in contemporary biology as:

- (A) Insecticide
- (B) Agent for production of dairy products
- (C) Source of industrial enzyme
- (D) Indicator of water pollution

AIPMT 2008 Prelims · Q184

43. Trichoderma harzianum has proved a useful microorganism for

- (A) Biological control of soil-borne plant pathogens
- (B) Bioremediation of contaminated soils
- (C) Reclamation of wastelands
- (D) Gene transfer in higher plants

44. Modern detergents contain enzyme preparations of

- (A) Thermophiles
- (B) Acidophiles
- (C) Alkaliphiles
- (D) Thermoacidophiles

45. Which one of the following proved effective for biological control of nematodal disease in plants?

- (A) Paecilomyces lilacinus
- (B) Pisolithus tinctorius
- (C) Pseudomonas cepacia
- (D) Gliocladium virens

46. Probiotics are

- (A) cancer inducing microbes
- (B) new kind of food allergens
- (C) live microbial food supplement
- (D) safe antibiotics

47. Which one of the following statements is correct?

- (A) Both Azotobacter and Rhizobium fix atmospheric nitrogen in root nodules of plants.
- (B) Cyanobacteria such as Anabaena and Nostoc are important mobilizers of phosphates and for plant nutrition in soil
- (C) At present it is not possible to grow maize without chemical fertilizers
- (D) Extensive use of chemical fertilizers may lead to eutrophication of nearby water bodies.

48. Which one of the following pairs is wrongly matched?

- (A) yeast - ethanol
- (B) streptomycetes - antibiotic
- (C) coliforms - vinegar
- (D) methanogens - gobar gas

49. For retting of jute the fermenting microbe used is :

- (A) Helicobacter pylori
- (B) Methophilic bacteria
- (C) Streptococcus lactin
- (D) Butyric acid bacteria

Answer key and explanations

1. Answer: (A) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

Aspergillus niger produces citric acid, Acetobacter aceti acetic acid, Clostridium butylicum butyric acid, and Lactobacillus lactic acid. Hence (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii).

2. Answer: (D) Activated sludge

After secondary treatment the floc settles as activated sludge; a small part is sent back to the aeration tank as inoculum and the major part goes into anaerobic sludge digesters. Primary sludge and floating debris are removed earlier, and the primary effluent goes to the aeration tank, not to the digester.

3. Answer: (B) (a)-ii, (b)-i, (c)-iv, (d)-iii

Clostridium butylicum produces butyric acid, Trichoderma polysporum gives cyclosporin A, Monascus purpureus gives statins that lower blood cholesterol, and Aspergillus niger produces citric acid. Hence butyric acid, cyclosporin A, cholesterol-lowering agent, citric acid is correct.

4. Answer: (B) Statin

Statins, produced by the yeast *Monascus purpureus*, competitively inhibit the enzyme of cholesterol synthesis and lower blood cholesterol. Cyclosporin A is an immunosuppressant and streptokinase is a clot buster.

5. Answer: (B) Trichoderma, Baculovirus, Bacillus thuringiensis

Trichoderma (fungal biocontrol of plant pathogens), baculoviruses (insect pathogens) and *Bacillus thuringiensis* (Bt toxin against caterpillars) are all biocontrol agents. Tobacco mosaic virus and aphids are plant pests, while *Rhizobium*, *Nostoc* and *Azospirillum* are biofertilisers.

6. Answer: (B) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(v)

Lactobacillus converts milk to curd, *Saccharomyces cerevisiae* (baker's yeast) leavens bread, *Aspergillus niger* produces citric acid and *Acetobacter aceti* produces acetic acid. Swapping citric and acetic acid between the fungus and the bacterium is the common error.

7. Answer: (A) Trichoderma

Trichoderma species are free-living fungi in root ecosystems that act against several plant pathogens. *Anabaena* is a nitrogen-fixing biofertiliser and *Chlorella* is a source of single cell protein.

8. Answer: (A) Vitamin B₁₂

Lactic acid bacteria such as *Lactobacillus* that turn milk into curd also increase its vitamin B₁₂ content, which NCERT notes as the nutritional improvement. They do not synthesise the fat-soluble vitamins A, D or E.

9. Answer: (C) Primary treatment

Primary treatment is the physical stage: floating debris is removed by sequential filtration and grit and suspended solids settle out by sedimentation as primary sludge. Secondary treatment is biological and removes dissolved organic matter (BOD) through microbes, not suspended solids.

10. Answer: (B) Rhodospirillum - Mycorrhiza

Rhodospirillum is a free-living, anaerobic photosynthetic nitrogen-fixing bacterium, while mycorrhiza is an association of a fungus with plant roots, so that pairing is the mismatch. Frankia forms root nodules on *Alnus*, *Anabaena* is a nitrogen-fixing cyanobacterium and *Rhizobium* nodulates legumes such as alfalfa.

11. Answer: (D) Clostridium butylicum - Lipase - removal of oil stains

Clostridium butylicum is used to produce butyric acid, not lipase; lipases for removing oily stains in detergents come from other microbes. Cyclosporin A from Trichoderma, statins from *Monascus* and streptokinase from *Streptococcus* are correctly matched.

12. Answer: (C) Methanogens

Methanogens such as *Methanobacterium* are archaeobacteria in the rumen and in cattle dung that produce methane, the main component of biogas. Halophiles and thermoacidophiles are archaeobacteria of salty and hot acidic habitats.

13. Answer: (D) Methanogens

The rumen of cattle and buffalo contains methanogens such as *Methanobacterium*, which help break down cellulose and release methane. Cyanobacteria, *Chlorella* and *Fucus* are photosynthetic and do not live in the gut.

14. Answer: (A) Methane, Hydrogen Sulphide and CO₂

Anaerobic bacteria digesting sludge produce biogas, a mixture of methane, hydrogen sulphide and carbon dioxide. Oxygen is not produced in this anaerobic process, and listing only methane and CO₂ or only H₂S and CO₂ leaves out a component.

15. Answer: (A) Aspergillus

The fungus *Aspergillus niger* is the industrial producer of citric acid. *Saccharomyces* is used for ethanol and baking, and *Clostridium* for butyric acid.

16. Answer: (A) methane, hydrogen sulphide, carbon dioxide

In the anaerobic sludge digesters of a sewage treatment plant, bacteria produce biogas consisting of methane, hydrogen sulphide and carbon dioxide. Oxygen is not produced under anaerobic conditions.

17. Answer: (B) Methane

Biogas (gobar gas) produced by methanogens in cattle dung is mostly methane, about 50–70%. Carbon dioxide is the second main component but present in a smaller amount.

18. Answer: (C) Streptokinase

Streptokinase, produced by *Streptococcus* and modified by genetic engineering, is a clot buster that dissolves blood clots in the coronary arteries of myocardial infarction patients. Statins lower blood cholesterol and cyclosporin A is an immunosuppressant used in organ transplants.

19. Answer: (B) Estimating the amount of organic matter in sewage water

BOD is the amount of oxygen consumed if all the organic matter in one litre of water were oxidised by bacteria, so it measures the organic matter in sewage. It has nothing to do with RBC oxygen carrying, engines, or curd making, which is in any case done by *Lactobacillus* and not yeast.

20. Answer: (D) Bread and beer

Saccharomyces cerevisiae (baker's/brewer's yeast) is used to make bread by fermenting dough and to brew beer. Cheese and butter depend on bacteria, citric acid comes from *Aspergillus*, and lactic acid from *Lactobacillus*.

21. Answer: (B) Trichoderma sp. against certain plant pathogens

Trichoderma is a free-living fungus used as a biocontrol agent against several plant pathogens, so it is microbial biocontrol. A ladybird beetle is an insect, not a microbe; nucleopolyhedrovirus is used against insect pests, not white rust; and Bt-cotton is a transgenic crop, not biocontrol.

22. Answer: (C) Anabaena

The cyanobacterium *Anabaena azollae* lives in the leaf cavities of the water fern *Azolla* and fixes nitrogen, so *Azolla* is used as a biofertiliser in rice fields. *Frankia* forms nodules on non-legumes like *Alnus*, and *Spirulina* is grown as single-cell protein.

23. Answer: (D) Glomus

Glomus is a fungus that forms mycorrhiza with plant roots and helps absorb phosphorus from the soil. *Azotobacter* is a free-living nitrogen fixer and *Trichoderma* is a free-living biocontrol fungus, not a symbiont.

24. Answer: (A) Blood cholesterol lowering statins

The yeast *Monascus purpureus* produces statins, which lower blood cholesterol by competitively inhibiting the enzyme that synthesises cholesterol. Streptokinase comes from *Streptococcus*, citric acid from *Aspergillus niger* and ethanol from *Saccharomyces*.

25. Answer: (D) A: Organ-transplant, B: Trichoderma

Cyclosporin A, an immunosuppressant given to organ-transplant patients, is obtained from the fungus *Trichoderma polysporum*. *Monascus* yields statins (cholesterol-lowering), and *Penicillium* yields penicillin, an antibiotic rather than a heart drug.

26. Answer: (A) Clostridium butylicum - lactic acid

Clostridium butylicum produces butyric acid; lactic acid comes from bacteria such as *Lactobacillus*, so this pair is wrong. *Aspergillus niger* produces citric acid, *Acetobacter aceti* acetic acid, and the yeast *Monascus purpureus* statins.

27. Answer: (A) Biological process

Secondary treatment of sewage is a biological process: the primary effluent is aerated so that aerobic microbes form flocs and consume the organic matter, reducing the BOD. Primary treatment, by contrast, is a physical removal of debris by filtration and sedimentation.

28. Answer: (B) Agrobacterium

Agrobacterium tumefaciens is a plant pathogen that causes crown gall and is used as a vector in genetic engineering, not as a biofertiliser. *Rhizobium* and *Nostoc* fix nitrogen, and mycorrhiza helps phosphorus uptake.

29. Answer: (B) Glomus

Fungi of the genus *Glomus* form mycorrhiza with plant roots and help absorb phosphorus from the soil. *Anabaena*, *Rhizobium* and *Frankia* are nitrogen fixers.

30. Answer: (A) Marsh gas

In sludge digesters, anaerobic bacteria (including methanogens) break down sewage and give off a gas mixture rich in methane, also called marsh gas or biogas. Laughing gas is nitrous oxide, and mustard gas is a chemical weapon.

31. Answer: (B) Saccharomyces

Ethanol is produced commercially by fermentation with the yeast *Saccharomyces cerevisiae*. *Aspergillus* is used for citric acid, *Clostridium* for butyric acid and *Trichoderma* for cyclosporin A.

32. Answer: (A) Molasses

Molasses, the sugar-rich by-product of sugarcane processing, is the most common substrate fermented by yeast in distilleries. Corn meal can be used but needs starch hydrolysis first, and soya meal and gram are protein-rich.

33. Answer: (D) Rhizobium

Soyabean is a legume, and Rhizobium forms root nodules on legumes and fixes atmospheric nitrogen symbiotically. Azotobacter and Azospirillum are free-living or associative fixers, and Nostoc is a cyanobacterium used for paddy fields.

34. Answer: (B) Glomus

Glomus is a fungus that forms vesicular-arbuscular mycorrhiza, growing inside root cortical cells (endomycorrhiza) and helping the plant absorb phosphorus. Nostoc is a cyanobacterium, Rhizobium is a nitrogen-fixing bacterium, and Agaricus is a mushroom, none of which form endomycorrhiza.

35. Answer: (A) Activated sludge-sediment in settlement tanks of sewage treatment plant is a rich source of aerobic bacteria

Activated sludge is the settled mass of aerobic bacterial flocs from secondary treatment, and part of it is pumped back as inoculum. Biogas is made by anaerobic methanogens such as Methanobacterium, and it is a mixture of mainly methane with CO₂ and H₂, not pure methane.

36. Answer: (A) Snail

Glomus (a mycorrhizal fungus) and Oscillatoria (a cyanobacterium) are biofertilisers, and earthworms make vermicompost, so all three help organic farming. Snails have no such role and are usually crop pests.

37. Answer: (A) Trichoderma

The free-living fungus Trichoderma lives in the root ecosystem and controls several plant pathogens, so it is used against plant diseases. Baculoviruses and Bacillus thuringiensis are biocontrol agents against insect pests rather than diseases, and Glomus is a biofertiliser.

38. Answer: (C) increases when sewage gets mixed with river water.

BOD is the amount of oxygen consumed when microbes oxidise the organic matter in a litre of water; sewage adds a lot of organic matter, so BOD rises. BOD is about oxygen use by microbes in general, not a count of Salmonella.

39. Answer: (A) Alcohol - nitrogenase

Alcohol is produced by yeast fermentation using zymase enzymes; nitrogenase is the nitrogen-fixing enzyme and has no role in alcohol production. Pectinases clarify fruit juices, lipases are used in detergents and amylases are used for desizing textiles.

40. Answer: (C) Xanthomonas campestris

Xanthomonas campestris is a plant pathogen (black rot of crucifers) and is used commercially for xanthan gum, not as a biopesticide. Trichoderma, nucleopolyhedroviruses and Bacillus thuringiensis are all NCERT examples of biocontrol agents.

41. Answer: (B) Frankia

Frankia is an actinomycete that fixes nitrogen in root nodules of non-leguminous plants such as Alnus, a symbiotic association. Azotobacter is free-living, Azolla is a fern that hosts the nitrogen-fixer Anabaena, and Glomus is a mycorrhizal fungus that helps phosphorus uptake.

42. Answer: (A) Insecticide

Bacillus thuringiensis spores and its Bt toxin genes are used to kill insect larvae such as caterpillars, making it a biological insecticide. Dairy products are made with lactic acid bacteria, not Bt.

43. Answer: (A) Biological control of soil-borne plant pathogens

Trichoderma species are free-living fungi in the root ecosystem, and NCERT lists them as biocontrol agents against several plant pathogens. Gene transfer in plants is done with Agrobacterium, not Trichoderma.

44. Answer: (C) Alkaliphiles

Laundry detergents work in alkaline wash water, so the proteases and lipases added to them come from alkaliphilic microbes (for example alkaliphilic Bacillus species) whose enzymes stay active at high pH. Enzymes from acidophiles would lose activity in an alkaline detergent solution.

45. Answer: (A) Paecilomyces lilacinus

Paecilomyces lilacinus is a nematophagous fungus that parasitises the eggs of root-knot and cyst nematodes and is sold as a bionematicide. Pisolithus tinctorius is an ectomycorrhizal fungus, and Gliocladium virens and Pseudomonas cepacia are mainly used against fungal pathogens.

46. Answer: (C) live microbial food supplement

Probiotics are live beneficial microbes, such as Lactobacillus, taken as food supplements to improve the balance of gut microflora. They are living organisms, not antibiotics, which are chemicals that kill or inhibit microbes.

47. Answer: (D) Extensive use of chemical fertilizers may lead to eutrophication of nearby water bodies.

Fertiliser run-off adds nitrates and phosphates to lakes and ponds, causing algal blooms and eutrophication. Azotobacter is free-living and does not form root nodules, and Anabaena and Nostoc fix nitrogen rather than mobilising phosphate (that is done by mycorrhizal fungi such as Glomus).

48. Answer: (C) coliforms - vinegar

Vinegar (acetic acid) is produced by Acetobacter aceti, not by coliforms; coliforms are gut bacteria used as indicators of faecal contamination. Yeast makes ethanol, Streptomyces makes antibiotics and methanogens produce biogas, so those pairs are correct.

49. Answer: (D) Butyric acid bacteria

During retting, jute stems are soaked in water and anaerobic butyric acid bacteria (such as Clostridium) break down the pectin that holds the fibres together, which frees the fibres. Helicobacter pylori causes stomach ulcers and lactic streptococci sour milk; neither one rets fibres.

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