1. The primary treatment of waste water involves the removal of
(a) Stable particles (b) Dissolved impurities
(c) Toxic substances (d) Harmful bacteria

2. Fill up the blanks by selecting the correct option.
(i) Biogas is a mixture of gases which predominantly contains ____ and is used as _____
(ii) Methanogens are commonly found in the _____ during sewage treatment.
(iii) _____ species are free-living fungi and effective biocontrol agents of several plant pathogens.
(a) (i) CO_2 , fuel (ii) Primary sludge (iii) Trichoderma
(b) (i) Methane, fuel (ii) anaerobic sludge (iii) Baculoviruses
(c) (i) Methane, fuel (ii) aerobic sludge (iii) Trichoderma
(d) (i) Methane, fuel (ii) anaerobic sludge (iii) Trichoderma

3. Symbiotic asociation is exhibited by
A. mycorrhiza B. Rhizobium C. heterocyst D.Yeast
(a) A, C, D (b) A, B, C, D (c) B, C, D` (d) A, B

4. The large vessels for growing microbes on an industrial scale are called
(a) Petri dish (b) Digestors
(c) Biogas vessel (d) Fermentors

5. During which stage of sewage treatment microbes are used?
(a) Primary treatment (b) Secondary treatment
(c) Tertiary treatment (d) All of these

6. In chesse manufacure, the micro-organisms are used for –
(a) The souring of milk only
(b) The ripening only
(c) Development of resistance to spoilage
(d) Both a and b

7. I. All cyanobacteria are N_2
II. The main sources of biofertilizers are bacteria, fungi and cyanobacteria
III. Azospirillum and Azotobacter are symbiotic N_2-fixers
IV. Microbes like bacteria and many fungi can be grown on nutritive media to form colonies but they cannot be seen with the naked eyes.
(a) All are correct (b) All are wrong
(c) Only I, III and IV are wrong (d) Only II is wrong

8. Which of the followings is mainly produced by the activity of anaerobic bacteria on sewage?
(a) Marsh gas (b) Laughing gas
(c) Propane (d) Mustard gas

9. Which group is not related with petroplantation:
(a)Euphorbiaceae
(b)Asdepiadiaceae
(c)Apocyanaceae
(d)Leguminaceae

10. Biogas produced by anaerobic fermentation of waste biomass consists of:
(a) methane
(b) traces of H_2, H_2S and N_2
(c)CO_2
(d) all of these

11. The puffed - up appearance of dough is due to
(a) Growth of LAB
(b) Production of O_2& ethanol
(c) Production of CO_2

(d) Growth of yeast Monascus

12. Microbial insecticide is:
(a)*Bacilluspolymixa*
(b)*Bacillusbrevis*
(c) Bacillus subtilio
(d) Bacillus thuringenesis

13. *Monascuspurpureus* is a yeast used commercially in the production of : -
(a) citric acid
(b) blood chlolesterol lowering statins
(c) ethanol
(d) streptokinase for removing dots from the blood vessels.

14. Match the following column correctly : -

	Column I		Column II
A	Statins	i	*Monascuspurpureus*
B	Cyclosporins	ii	*Trichoderma*
C	Acetic acid	iii	*Acetobacteraceti*
D	Butyric acid	i∨	*Clostridium butyricum*

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

15. Conversion of milk to curd improves its nutritional value by increasing the amount of
(a) Vitamin D
(b) Vitamin A
(c) Vitamin B_{12}
(d) Vitamin E

16. For purpose of curdling, an-inoculums is added to the milk. This inoculums contains:
(a) Bacteria (b) Lactic acid
(c) Flavoring agent (d) Vitamin B_{12}

17. Select the incorrect statement:
(a) Swiss cheese possess larger holes
(b) Toddy is prepared from fermented sap of palms
(c) Potential of penicillin as antibiotic was discovered by A. Fleming
(d) Wine is prepared without distillation

18. Identify the N_2 fixing cyanobacteria:
(a) Rhizobium (b) Azotobacter
(c) Azolla (d) Oscillatoria

19. In biogas plant, biowaste and slurry of dung are added to:
(a) Floating cover (b) Gas holder
(c) Digester (d) Outlet pipe

20. STPs (Sewage Treatment Plants) make the sewage
(a) Less polluting (b) More polluting

(c) Non-polluting (d) Potable

21. Cochineal insects have proved very useful for

(a) cactus prevention
(b) Eichhornia prevention
(c) weeds control
(d) Parthenium control. (1996)

22. One of the major difficulties in the biological control of insect pest is that

(a) the method is less effective as compared with the use of insecticides
(b) the practical difficulty of introducing the predator to specific areas
(c) the predator develops a preference to other diets and may itself become a pest
(d) the predator does not always survive when transferred to a new environment. (1995)

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

(a) Azotobacter
(b) Aspergillus
(c) Glomus
(d) Trichoderma (2012)

24. A prokaryotic autotrophic nitrogen fixing symbiont is found in

(a) Alnus
(b) Cycas
(c) Cicer
(d) Pisum. (2011)

25. Which one of the following is not a biofertiliser?

(a) Agrobacterium
(b) Rhizobium
(c) Nostoc
(d) Mycorrhiza (2011)

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

(a) Glomus
(b) Earthworm
(c) Oscillatoria
(d) Snail (2010)

27. A free living nitrogen-fixing cyanobacterium which can also form symbiotic association with the water fern Azolla is

(a)Tolypothrix
(b) Chlorella
(c) Nostoc
(d) Anabaena. (2004)

28. Which aquatic fern is used to increase the yield in paddy crop?

(a) Azolla
(b) Salvinia
(c) Marsilea
(d)Isoetes (2000)

29. Which of the following is non-symbiotic biofertilizer?

(a) Anabaena
(b) Rhizobium
(c) VAM
(d) Azotobacter (1998)

30. Which one of the following statements is correct?

(a) Legumes fix nitrogen only through the specialized bacteria that live in their roots.
(b) Legumes fix nitrogen independently of the specialized bacteria that live in their roots.
(c) Legumes fix nitrogen only through specialized bacteria that live in their leaves.
(d) Legumes are incapable of fixing nitrogen. (1994)

1. (a)

2. (d)

3. (d)

4. (d)

5. (b)

6. (d)

7. (c)

8. (a)

9. (d)
10. (d)
11. (c)
12. (d)
13. (b)
14. (a)
15. (c)
16. (a)

17. (c)

18. (d)

19. (c)

20. (a)

21. (a) : Extensive growth of Opuntia (Cactus) in Australia was checked through introduction of its natural herbivore, cochineal insect (Cactoblastis cactorum).

22. (d): Insect enemies play an important role in nature for managing the phytophagous insect pests and keep a balance. It is just possible that predators of a particular plant pest are unable to get established and multiply in a particular environment. In such cases, the predators are reared in the laboratory and let off at a particular time when the pests are about to threaten the crops. And then this practice become expensive.

23. (c) : Azotobacter, Aspergillus and Trichoderma all are free living microbes that help plants in their nutrition. Glomus is a fungus that symbiotically forms endomycorrhiza that helps in absorption of nutrition specially phosphorus from soil.

24. (b): Cycas forms facultative symbiotic association with autotrophic nitrogen fixing cyanobacteria. Cycas provides carbon and a stable environment to the cyanobacteria in exchange for fixed nitrogen. These cyanobacteria are endosymbionts and live within the roots of Cycas. In addition to normal roots, Cycas develops specialised symbiotic organs at a young age called pre-coralloid roots which transform into coralloid roots upon successful colonisation by cyanobacteria.

25. (a) :Biofertilisers are organisms that enrich the nutrient quality of the soil. The main sources of biofertilisers are bacteria, fungi and cyanobacteria. Rhizobium bacteria is found in the nodules on the roots of leguminous plants

by symbiotic association. These bacteria fix atmospheric nitrogen into organic forms, which is used by the plants as nutrient. Fungi are also known to form symbiotic associations with plants called mycorrhiza. Cyanobacteria are autotrophic microbes widely distributed in an aquatic and terrestrial environments. Many of which can fix atmospheric nitrogen, e.g., Anabaena, Nostoc, Oscillatoria, etc. Agrobacterium tumefaciens is a pathogen of several dicot plants. It causes gall tumour in the plants.

26. (d): Organic farming is a method of farming system which primarily aimed to keep the soil alive and in good health by use of organic wastes and other biological material alongwith beneficial microbes (biofertilizers) to release nutrients to crops for increased sustainable production in an ecofriendly, pollution free environment. Basic components of organic farming are green manures, farm yard manure, vermicompost, crop rotation, biopesticides and biofertilizers. Glomus being a mycorrhizal component, earthworm being a vermicompost and Oscillatoria being a nitrogen fixing blue green algae can be used in organic farming. Snail cannot be a component of organic farming.

27. (d): Anabaena is a free living nitrogen fixing cyanobacterium which can form symbiotic association with the water fern Azolla.

28. (a) : Azolla plays a very important role in rice production. Azolla and its nitrogen-fixing partner, Anabaena, have been used as green manure to fertilise rice paddies and increase production. With the help of Azolla, rice can be grown year after year, several crops a year, with little or no decline in productivity; hence no rotation of crops is necessary. So, Azolla is an excellent biofertilizer.

29. (d): Biofertilizers are organisms which bring about nutrient enrichment of the soil. Azotobacter is a free living, aerobic, nitrogen fixing bacteria. Anabena is a nitrogen fixing cyanobacteria that occurs in both free living and symbiotc associations with Azolla, Cycas roots, etc. Rhizobium lives symbiotically in root nodules of legumes and non-legumes. Vesicular-arbuscular mycorrhiza (VAM) is an example of endomycorrhiza in which fungal hyphae penetrate the cortical cells of grasses to form vesicles.

30. (a) : The nitrogen-fixing ability of leguminous plants is not a property of the plants as such but results from infection of their roots by bacteria in the soil, infection leading to the formation of nodules. These organisms are Gram-negative motile rods that are classified in the genus Rhizobium.