MICROBES IN HUMAN WELFARE

1. Microorganisms or microbes are found in
   (A) soil, air, water and inside the bodies of living organisms
   (B) thermal vents deep in soil
   (C) under snow and in highly acidic environments
   (D) All of the above

2. The microscopic proteinaceous infectious agents are
   (A) viroids
   (B) prions
   (C) protozoans
   (D) bacteria

3. Which of the following bacteria convert milk into curd?
   (A) Propionibacteriumshermanii
   (B) Saccharomyces cerevisiae
   (C) Lactobacillus
   (D) Thermophilic bacteria

4. The starter or inoculum is added to the fresh milk in order to convert milk into curd and improves its nutritional quality by increasing
   (A) vitamin-B12
   (B) protein
   (C) calcium
   (D) All of these

5. Which gas is released during the process of fermentation that gives the puffy appearance to dough for making bread?
   (A) CO_2
   (B) CO
   (C) O_2
   (D) H_2

6. Swiss cheese is formed by the bacterium
   (A) Aspergillusniger
   (B) Lactobacillus
   (C) Propionibacteriumshemanii
   (D) Penicilliumroqueforti

7. The alcoholic beverages produced by the distillation of the fermented broth are
    (A) wine and beer
    (B) wine, whisky and brandy
    (C) whisky, brandy and rum
    (D) whisky, beer and brandy

8. Which of the following organisms is used in the production of beverages like wine, beer, whisky brandy or rum?
    (A) Clostridium butylicum
    (B) Aspergillusniger
    (C) Saccharomyces cerevisiae
    (D) Penicilliumnotatum

9. Which one of the following antibiotics was extensively used to treat American soldiers wounded in World War-II?
    (A) Streptokinase
    (B) Penicillin
    (C) Statins
    (D) Neomycin

10. Antibiotics are used to treat diseases like
    (A) diphtheria, whooping cough
    (B) plague
    (C) leprosy
    (D) All of the above

11. Which one of these microbes is used in the commercial production of butyric acid?
    (A) Clostridium butylicum
    (B) Streptococcus butylicum
    (C) Trichodermapolysporum
    (D) Saccharomyces cerevisiae

12. Choose the incorrect pair.
    (A) Lipases – Used in detergents for removing oil stains
    (B) Pectinases and proteases – Used in clarifying bottled juices
    (C) Statins – Competitively inhibit the enzyme responsible for cholesterol synthesis
    (D) None of the above

13. Which of the following is used as ‘clot buster’ for removing clots from blood vessels of patient who have undergone myocardial infarction?
    (A) Ethanol
    (B) Statins
    (C) Cyclosporin-A
    (D) Streptokinase

14. Sewage contains large amounts of …A… and …B… . Here A and B refer to
    (A) A–inorganic matter, B–bacteria
    (B) A–organic matter, B–pathogenic microbes
    (C) A–organic matter, B–virus
    (D) A–inorganic matter, B–pathogenic microbes

15. In the primary treatment of sewage, the soil and small pebbles are removed by
    (A) filtration
    (B) sedimentation
    (C) condensation
    (D) evaporation

16. In the biological treatment of sewage, the masses of bacteria held together by fungal filament to form mesh-like structures called as
    (A) activated sludge
    (B) aerobic process
    (C) flocs
    (D) anaerobic sludge

17. In the sewage treatment, bacterial flocs are allowed to sediment in a settling tank. This sediment is called as
    (A) activated sludge
    (B) primary sludge
    (C) anaerobic sludge
    (D) secondary sludge

18. Microbes are used in
    I. primary treatment of sewage.
    II. secondary treatment of sewage.
    III. anaerobic sludge digesters.
    IV. production of biogas. Choose the correct option.
    (A) I, II and III
    (B) I, III and IV

(C) II, III and IV
(D) All of the above

19. The BOD test measures the rate of uptake of oxygen by microbes in water bodies. The greater BOD of sample water, indicates that
(A) it is highly polluted
(B) it is not polluted
(C) it is moderately polluted
(D) pollution level cannot be determined

20. Which of the following plans has been initiated by the Ministry of Environment and Forests to protect rivers from water pollution?
(A) Ganga action plan
(B) Yamuna action plan
(C) Both (A) and (B)
(D) None of the above

21. The most flammable gaseous component of biogas is
(A) methane, CO_2 , H_2 and H S_2
(B) methane
(C) CO_2 , H_2 and H S_2
(D) CO, methane and N_2

22. Which of the following bacteria is present in the rumen of cattle?
(A) Rhizobium
(B) Azotobacter
(C) Methanobacterium
(D) Clostridium

23. Gobar gas generation technology in India was developed by the collaboration of ...A... and ...B... . Here, A and B refer to
(A) A–Rural Bank of India, B–Khadi and Village Industries Commission
(B) A–Indian Agricultural Research Institute, B–Khadi and Village Industries Commission
(C) A–National Bank for Agriculture and Development, B–Indian Agricultural Research Institute
(D) A–National Bank for Agriculture and Development, B–Khadi and Village Industries Commission

24. Bacillus thuringiensis is used as
    (A) biofungicide
    (B) biopesticide
    (C) biocontrol agent
    (D) bioweapon

25. Cultivation of Bt cotton has been much in the news. The prefix Bt means
    (A) 'Barium-treated' cotton seeds
    (B) 'Bigger thread' variety of cotton with better tensile strength
    (C) produced by 'biotechnology' using restriction enzymes and ligases
    (D) carrying an endotoxin gene from Bacillus thuringiensis

26. Trichoderma species, free-living fungi, are present in root ecosystems are potentially useful as
    (A) biopesticides
    (B) biofertilisers
    (C) methanogens
    (D) vectors for genetic engineering

27. Baculoviruses (Nucleopolyhedrovirus) do not show
    (A) host specificity
    (B) narrow spectrum applications
    (C) effects on non-target insects
    (D) utility in IPM programme

28. A biocontrol agent to be a part of an integrated pest management should be
    (A) species-specific and symbiotic
    (B) free-living and broad spectrum
    (C) narrow spectrum and symbiotic
    (D) species-specific and inactive on non-target organisms

29. Organic farming includes
    (A) use of fertilisers and pesticides of biological origin
    (B) IPM (Integrated Pest Management)
    (C) locally developed pest resistant varieties
    (D) All of the above

30. Which of the following are the part or example of symbiotic mutualistic association?
    (A) Rhizobium
    (B) Mycorrhiza

(C) Both (A) and (B)
(D) Oscillatoria

31. Which of the following is common to Azospirillum, Anabaena, Nostoc and Oscillatoria?
    (A) N2 -fixer microbes
    (B) Prokaryotic organism
    (C) Both (A) and (B)
    (D) Eukaryotic organism

32. A biocontrol agent used for pest butterfly caterpillars is
    (A) Trichoderma
    (B) Bacillus thuringiensis
    (C) Pseudomonas
    (D) Rhizobium

33. Select the group of organisms that are used as biofertilisers in organic farming.
    (A) Clostridium, Beijerinckia, Glomus and Anabaena
    (B) Trichoderma, Baculovirus and B. thuringiensis
    (C) Nostoc, Azollapinnata and Tobacco mosaic virus
    (D) Penicillium, Streptococcus and Aspergillus

Answer Key

1	(D)	2	(B)	3	(C)	4	(A)	5	(A)
6	(C)	7	(C)	8	(C)	9	(B)	10	(D)
11	(A)	12	(D)	13	(D)	14	(B)	15	(B)
16	(C)	17	(A)	18	(C)	19	(A)	20	(C)
21	(B)	22	(C)	23	(B)	24	(C)	25	(D)
26	(A)	27	(C)	28	(D)	29	(D)	30	(C)
31	(C)	32	(B)	33	(A)				

HINTS & EXPLANATIONS

2. (B) Prions are the microscopic protein particles similar to a virus, but lack nucleic acid. These are assumed to be the infectious agent, responsible for scrapie and certain other degenerative diseases of the nervous system.
3. (C) Lactobacillus is added to milk which converts lactose (sugar of milk) into lactic acid. Lactic acid causes coagulation and partial conversion of milk protein casein to calcium paracaseinate. These chemical changes in milk help in its conversion into curd, yoghurt and cheese.
5. (A) The dough, which is used for making foods such as dosa, bread and idli are also fermented by bacteria. The puffed up appearance of dough is due to the production of CO_2 gas by these bacteria.
6. (C) Swiss cheese is formed with the help of single strain of Propionibacteriumshermanii. Its characteristic feature is the formation of large holes due to the production of a large amount of CO_2 .
7. (C) Distilled spritis are alcoholic beverages in which the concentration of ethyl alcohol is more than the original fermented mixture which is obtained by distillation. These beverages are whisky, brandy and rum. Other beverages like wine and beer are produced without distillation.
8. (C) An yeast, Saccharomyces cerevisiae, is used in the production of alcoholic beverages like wine, beer, whisky, brandy or rum. Beverages are generally formed by fermenting malted cereals and fruit juices with this yeast to produce ethanol or alcohol.
10. (D) Antibiotics have greatly improved our capacity to treat deadly diseases such as diphtheria (gal ghotu), whooping cough (kali khansi), plague, leprosy (kushtrog), which is used to kill millions of people all over the world.
13. (D) Streptokinase produced by the bacterium Streptococcus and modified by genetic engineering is used as a clot buster for removing clots from the blood vessels of patients who have undergone myocardial infarction leading to heart attack.
16. (C) In the biological treatment of sewage, flocs are formed. These are masses of bacteria associated with fungal filaments to form a mesh-like structure. The growing microbes consume organic matter and thus reduce the Biochemical Oxygen Demand (BOD) and lowers the level of pollutants.
17. (A) In the sewage treatment, when Biochemical Oxygen Demand (BOD) of sewage has reduced, the effluent is passed into settling tank. Here, the bacterial flocs settle and the sediment thus formed is called activated sludge.
18. (C) Primary treatment does not involve microbes. It is the physical removal of large and small particles from sewage. However, secondary treatment of the effluent

from the primary settling tank is purely a biological treatment involving microbial activity. Further, in the anaerobic sludge digesters, heterotrophic microbes anaerobically digest bacteria and fungi in the sludge producing mixture of gases such as methane, hydrogen sulphide and CO_2 , which form biogas. Thus, microbes are used in secondary treatment, anaerobic sludge digesters and biogas production.

19. (A) BOD is a measure of the organic matter present in water. Thus, greater the value of BOD in a sample of water, more will be its polluting potential. This indicates that the water body will be highly polluted.
20. (C) In order to protect the major rivers of India from water pollution, the Ministry of Environment and Forests, has initiated development of the sewage treatment plants under the National River Conservation Authority, so that only treated sewage may be discharged in the rivers, e.g. Ganga Action Plan (GAP), Yamuna Action Plan (YAP), Satluj Action Plan and Gomti Action Plan.
21. (B) The major component of biogas is methane (about 50-68%), and it is highly inflammable. The other gaseous components of biogas are carbon dioxide (25-35%), hydrogen (1-7%) and rarely hydrogen sulphide.
24. (C) Bacillus thuringiensis is a soil bacterium used as biocontrol agent that can control infestations by insect pests such as butterfly, caterpillars, ants, moths, etc. Some strains of these bacteria can kill animal and plant parasitic nematodes, snails, protozoans, etc.
27. (C) Baculoviruses (Nucleopolyhedrovirus) do not show effect on non-target insects. These viruses are excellent candidates for species-specific, narrow spectrum insecticidal applications. These have been known to shown no negative impacts on plants, mammals, birds, fish or even on non-target insects. 28 (D) For a biocontrol agent to be a part of an Integrated Pest Management (IPM) programme, it should be species-specific and inactive or have no negative impacts on non-target organisms like plants, mammals, birds, fish and even another non-target insects. It should kill only targeted insects/pests (organisms).
29. (D) Organic farming includes several methods to enhance soil fertility. In such farming, methods of biological origin are used, e.g. biopesticide, biofertilisers, IPM (Integrated Pest Management), locally developed pest resistant varieties, green manure, etc.
32. (B) Bacillus thuringiensis is the most effective biocontrol agent for insect pests such as butterfly caterpillars. Spores of this bacterium produce a toxic insecticidal protein called Cry. These proteins enter the host's body and reach gut where on activation they kill the host by lysis.