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Microbes in Human Welfare — CBSE Class 12 Biology Chapter Test

FREE CHAPTER TEST · CLASS XII · BIOLOGY (044) · PATTERN OF THE CBSE SAMPLE QUESTION PAPER 2026-27

TIME ALLOWED	MAXIMUM MARKS	QUESTIONS	NAME / ROLL NO.
1½ hours	37	17 (A 8 · B 3 · C 3 · D 1 · E 2)	

GENERAL INSTRUCTIONS

Read the following instructions very carefully and strictly follow them:

1. This question paper contains 17 questions. All questions are compulsory.
2. This question paper is divided into five sections: A, B, C, D and E.
3. Section A (Q1–8) contains 6 multiple choice questions and 2 assertion-reason based questions of 1 mark each.
4. Section B (Q9–11) contains short answer questions of 2 marks each.
5. Section C (Q12–14) contains short answer questions of 3 marks each.
6. Section D (Q15) contains case-based questions of 4 marks each, with sub-parts of 1, 2 and 1 marks.
7. Section E (Q16–17) contains long answer questions of 5 marks each.
8. There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 1 question in Section D, 2 questions in Section E. Attempt only one of the alternatives in such questions.
9. Draw neat, labelled diagrams wherever necessary.
10. This chapter test follows the section structure, question types and marks per question of the CBSE Class XII Biology (044) Sample Question Paper 2026-27, at about half the length of the 70-mark board paper: 37 marks in 1½ hours.
11. The answer key and the marking scheme are at the end of this booklet. Attempt the paper in 1½ hours before you look at them.

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Chapter: Microbes in Human Welfare · **Topics:** Microbes in household products · Microbes in industrial products · Microbes in sewage treatment · Microbes in the production of biogas · Microbes as biocontrol agents · Microbes as biofertilisers

SECTION A

This section comprises 8 questions of 1 mark each: 6 multiple choice questions (MCQs) and 2 assertion-reason based questions.

1. The large holes in Swiss cheese are due to the production of a large amount of CO_2 by 1

(A) Lactobacillus
(B) Propionibacterium sharmanii
(C) Saccharomyces cerevisiae
(D) Penicillium roqueforti

2. Microbes are found 1

(A) only in soil
(B) only in water
(C) even in thermal vents of geysers, deep in the soil and under layers of snow
(D) only inside other organisms

3. Microbes are grown on an industrial scale, to make products such as beverages and antibiotics, in very large vessels called 1

(A) fermentors
(B) test tubes
(C) petri dishes
(D) incubators

4. The 'clot buster' used to remove clots from the blood vessels of patients with myocardial infarction is 1

(A) cyclosporin A
(B) lipase
(C) pectinase
(D) streptokinase

5. Methane is produced in biogas plants by bacteria such as 1

(A) Rhizobium
(B) Azotobacter
(C) Methanobacterium
(D) Bacillus thuringiensis

6. The spent slurry removed from a biogas plant is used as 1

(A) manure
(B) fuel
(C) animal feed
(D) building material

7. **Assertion (A):** Many bacteria and fungi can be grown on nutritive media to form colonies that can be seen with the naked eye. 1
Reason (R): Viruses, viroids and prions are also counted as microbes.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

8. **Assertion (A):** Antibiotics are effective in treating viral infections such as the common cold. 1
Reason (R): Antibiotics are chemicals produced by some microbes that can kill or retard the growth of other, disease-causing microbes.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

SECTION B

This section comprises 3 short answer questions of 2 marks each.

9. (a) Name the organisms that produce cyclosporin A and statins, and state one medical use of each. 2

OR

(b) What are lipases and pectinases used for in industry?

10. (a) What is mycorrhiza? State two benefits that plants get from it. 2

OR

(b) How are cyanobacteria useful as biofertilisers? Name two of them.

11. What are baculoviruses? Why are they considered good biocontrol agents? 2

SECTION C

This section comprises 3 short answer questions of 3 marks each.

12. Describe the role of microbes in making (i) curd, (ii) dough for idli and dosa or bread, and (iii) toddy. 3

13. Describe the working of a biogas plant. Name the gases in biogas, and the institutions in India that developed the technology. 3

14. Describe the discovery of penicillin and its importance. 3

SECTION D

This section comprises 1 case-based question of 4 marks, with sub-parts of 1, 2 and 1 marks.

15. A class visits a sewage treatment plant. Raw sewage first passes through screens and settling tanks. The liquid is then pumped into large aeration tanks, where it is stirred and air is pumped in. After some time it passes into a settling tank, and the treated water is released into a river. The sludge is digested in large closed tanks.

(I) What is the BOD of water, and what does a high BOD indicate? [1]

(II) Explain what happens in the aeration tanks. [2]

(III) Which gases are produced in the anaerobic sludge digesters? [1]

OR

(III) What is 'activated sludge'? [1]

SECTION E

This section comprises 2 long answer questions of 5 marks each.

16. (a) Describe the role of microbes in industry in the production of (i) fermented beverages and (ii) organic acids, giving examples. 5

OR

(b) What is biological control of pests and diseases? Describe the use of ladybirds, dragonflies, Bacillus thuringiensis and Trichoderma. Why is biocontrol better than the use of chemical pesticides?

17. (a) What are biofertilisers? Describe the role of nitrogen-fixing bacteria, symbiotic and free-living, as biofertilisers. Why are biofertilisers preferred to chemical fertilisers, and why are they important in organic farming? 5

OR

(b) (i) Describe the primary treatment of sewage.

(ii) Why must sewage not be released untreated into rivers?

(iii) Name two plans started by the Ministry of Environment and Forests to save major Indian rivers from pollution.

END OF THE QUESTION PAPER

ANSWER KEY — SECTION A

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
(B)	(C)	(A)	(D)	(C)	(A)	(B)	(D)

MARKING SCHEME AND WORKED SOLUTIONS

Marks for each step are shown in brackets, as in the CBSE marking scheme. Any correct alternative method earns full marks.

Q1. Answer (B). Propionibacterium sharmanii; Roquefort cheese is ripened by a fungus.

Q2. Answer (C). Microbes are present everywhere, even where no other life form could exist, such as thermal vents (about 100 °C) and inside acidic environments.

Q3. Answer (A). Production on an industrial scale needs growing microbes in very large vessels, the fermentors.

Q4. Answer (D). Streptokinase, produced by the bacterium Streptococcus and modified by genetic engineering.

Q5. Answer (C). Methanogens such as Methanobacterium grow anaerobically on cellulosic material.

Q6. Answer (A). After the gas has been produced, the remaining slurry is rich in nutrients and is used as a fertiliser.

Q7. Answer (B). Both are true, but what counts as a microbe does not explain why bacteria and fungi form visible colonies on nutritive media (viruses cannot be grown this way). Answer B.

Q8. Answer (D). Antibiotics act against bacteria, not viruses, so A is false; R is true. Answer D.

Q9. (2 marks) Answer: (a) Trichoderma polysporum — immunosuppressant; Monascus purpureus — lowers cholesterol; (b) laundry; clear juices.
(a) Cyclosporin A, from the fungus Trichoderma polysporum, is used as an immunosuppressive agent in organ-transplant patients. [1] Statins, from the yeast Monascus purpureus, are used as blood-cholesterol-lowering agents. [1]
OR (b) Lipases are used in detergent formulations and help remove oily stains from laundry. [1] Pectinases and proteases are used to clarify bottled fruit juices. [1]

Q10. (2 marks) Answer: (a) fungus–root symbiosis; phosphorus, resistance; (b) nitrogen fixation in paddy fields.
(a) A symbiotic association of fungi (e.g. of the genus Glomus) with the roots of higher plants. [1] Any two: the fungus absorbs phosphorus from the soil and passes it to the plant; the plant shows resistance to root-borne pathogens, and tolerance to salinity and drought; overall increase in plant growth. [1]
OR (b) Cyanobacteria such as Anabaena, Nostoc and Oscillatoria are autotrophic and fix atmospheric nitrogen. [1] In paddy fields they serve as an important biofertiliser and also add organic matter to the soil, increasing its fertility. [1]

Q11. (2 marks) Answer: Nucleopolyhedrovirus; species-specific, narrow spectrum.
Pathogens that attack insects and other arthropods; most of those used are of the genus Nucleopolyhedrovirus. [1] They have species-specific, narrow-spectrum insecticidal action, with no harmful effect on non-target organisms (plants, mammals, birds, fish, beneficial insects), so they are very useful in integrated pest management, especially in ecologically sensitive areas. [1]

Q12. (3 marks) Answer: LAB; bacteria and baker's yeast, CO_2; palm sap fermentation.
(i) Lactobacillus and other lactic acid bacteria (LAB) grow in milk and convert it into curd; they produce acids that coagulate and partially digest the milk proteins; a small amount of curd added to fresh milk acts as the inoculum (starter). LAB also increase vitamin B_{12} and check disease-causing microbes in the stomach. [1]
(ii) Dough for idli and dosa is fermented by bacteria; its puffed-up appearance is due to CO_2. Bread dough is fermented by baker's yeast (Saccharomyces cerevisiae). [1]
(iii) Toddy, a traditional drink of southern India, is made by fermenting the sap from palms (by microbes). [1]

Q13. (3 marks) Answer: anaerobic methanogens in dung slurry; CH_4, CO_2, H_2S; IARI and KVIC.
A biogas plant has a concrete tank (10–15 feet deep) into which bio-wastes and a slurry of dung are fed; a floating cover rises as gas is produced in the tank by microbial activity. [1] Methanogens (e.g. Methanobacterium), present in the dung (from the rumen of cattle), break down the cellulosic material anaerobically; an outlet connected to a pipe supplies the gas to homes, and the spent slurry is removed through another outlet and used as fertiliser. [1] Biogas is mainly methane, with CO_2 and H_2S (and some H_2). The technology was developed in India mainly by the Indian Agricultural Research Institute (IARI) and the Khadi and Village Industries Commission (KVIC). [1]

Q14. (3 marks) Answer: Fleming, Penicillium notatum; Chain and Florey; Nobel Prize 1945.
Alexander Fleming, while working on Staphylococci bacteria, noticed that a mould growing in one of his unwashed culture plates prevented the bacteria from growing around it. [1] He found that this was due to a chemical produced by the mould, which he named penicillin after the mould Penicillium notatum. [1] Its full potential as an effective antibiotic was established much later by Ernest Chain and Howard Florey; it was used extensively to treat soldiers wounded in World War II. Fleming, Chain and Florey received the Nobel Prize in 1945. Antibiotics have greatly improved our capacity to treat deadly diseases. [1]

Q15. (4 marks) Answer: (I) oxygen demand; high organic pollution; (II) flocs consume organic matter, BOD falls; (III) CH_4, H_2S, CO_2, or flocs used as inoculum.
(I) The amount of oxygen that would be consumed if all the organic matter in one litre of water were oxidised by bacteria; a high BOD means high polluting potential (much organic matter). [1]
(II) The constant agitation and aeration let vigorous growth of useful aerobic microbes, which form flocs (masses of bacteria associated with fungal filaments to form mesh-like structures). [1] While growing, these microbes consume the major part of the organic matter in the effluent, significantly reducing its BOD. [1]
(III) Methane, hydrogen sulphide and carbon dioxide (biogas). [1]
OR (III) The sediment of bacterial flocs in the settling tank; a small part is pumped back into the aeration tank as the inoculum, and the rest goes to the anaerobic sludge digesters. [1]

Q16. (5 marks) Answer: (a) yeast, distilled and undistilled drinks; citric, acetic, butyric and lactic acids; (b) ladybird, dragonfly, Bt, Trichoderma.
(a) (i) Yeast, Saccharomyces cerevisiae (brewer's yeast), ferments malted cereals and fruit juices to produce ethanol. [1] Depending on the raw material and the processing, different drinks are made: wine and beer are produced without distillation [½], while whisky, brandy and rum are produced by distillation of the fermented broth. [1]
(ii) Aspergillus niger (a fungus) — citric acid [½]; Acetobacter aceti (a bacterium) — acetic acid [½]; Clostridium butylicum (a bacterium) — butyric acid [½]; Lactobacillus (a bacterium) — lactic acid. [½] These are produced in large fermentors on an industrial scale. [½]
OR (b) Biocontrol is the use of biological methods to control plant diseases and pests. [½] Ladybirds and dragonflies get rid of aphids and mosquitoes respectively. [1] Bacillus thuringiensis (Bt) spores are sprayed on plants (e.g. brassicas, fruit trees); caterpillars that eat them are killed by the toxin released in their gut, while other insects are unharmed; the Bt toxin genes have also been put into plants. [1½] Trichoderma species, free-living fungi in the root ecosystem, are effective biocontrol agents of several plant pathogens. [1] Biocontrol avoids toxic chemicals that kill useful as well as harmful organisms and pollute the environment, and allows integrated pest management that keeps pests at manageable levels. [1]

Q17. (5 marks) Answer: (a) Rhizobium, Azotobacter, Azospirillum; cost and pollution; organic farming; (b) primary treatment; high BOD and pathogens; Ganga and Yamuna Action Plans.

(a) Biofertilisers are organisms that enrich the nutrient quality of the soil; the main sources are bacteria, fungi and cyanobacteria. [1] Symbiotic: Rhizobium lives in the root nodules of leguminous plants and fixes atmospheric nitrogen into organic forms that the plant uses as nutrient. [1½] Free-living: Azospirillum and Azotobacter fix atmospheric nitrogen while living free in the soil, enriching its nitrogen content. [1] Chemical fertilisers are costly and their excessive use pollutes the soil and water; biofertilisers enrich the soil naturally. [1] In organic farming, which avoids chemicals, biofertilisers (with biocontrol agents) supply the nutrients the crop needs. [½]

OR (b) (i) Primary treatment removes particles by filtration and sedimentation: floating debris is removed by sequential filtration, and grit (soil and small pebbles) by sedimentation. [1] The settled solids form the primary sludge, and the supernatant, the effluent, is taken for secondary treatment. [1]

(ii) Untreated sewage contains a large amount of organic matter (very high BOD); in a river it is broken down by microbes that use up the dissolved oxygen, killing fish and other aquatic life. [1] Sewage also contains many pathogenic microbes, which spread water-borne diseases. [1]

(iii) The Ganga Action Plan and the Yamuna Action Plan. [1]

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