7. Introduction to Microbiology

Q. State whether the following statements are True or False. If False write the correct statement: (5M)

1. Wine is produced by fermentation process.

Ans : True.

2. Milk is fermented with the help of saccharomyces cerevisiae.

Ans : False – Milk is fermented with the help of lactobacilli.

3. Glycolipids are emulsifiers.

Ans : True.

4. Sulphur oxidizing bacteria decompose the xenobiotic chemicals present in sewage.

Ans : False – Phenol oxidizing bacteria decompose the xenobiotic chemicals presents in sewage.

5. Nocardia is a bacterial species that has the ability of decomposing rubber from garbage.

Ans : False – Nocardia is a fungal species that has the ability of decomposing rubber from garbage.

Q. Match the Pairs : **(5M)**

Column ‘A’	column ‘B’
6. xylitol	i. Fungi
7. Citric acid	ii. Protin binding emulsifier
8. Lycopene	iii. Ice-creams and puddings
9. xanthan gum	iv. To impart sweetness
10. Cheese	v. Pigment
	vi. To impart acidity

Ans : 6. Xylitol = iv. To impart sweetness

7. Citric acid = vi. To impart acidity

8. Lycopene = v. Pigment

9. xanthan gum = iii. Ice-creams and puddings

10. Cheese = i. Fungi

Q. Find the odd one out : **(5M)**

11. Lactobacillus acidophilus, Lactobacillus casei, Bifidobacterium bifidum, Streptococcus thermophiles.

Ans : Streptococcus thermophiles – All others are bacteria producing probiotics.

12. lactovacillus lactis, Bifidobacterium bifidum, Lactobacillus cremoris, Streptococcus thermophiles.

Ans : Bifidobacterium bifidum – All others are bacteria used in cheese production.

13. Dark chocolate, Miso soup, wafers, corn syrup

Ans : Wafers – All others are probiotic products.

14. Vinegar, Soya sauce, ketchup, Monosodium glutamate.

Ans : ketchup – All others are product prepared by microbial fermentation.

15. Actinomycetes, Streptomyces, Nocardia, Yeast

Ans : Yeast – All others have ability of decomposing rubber from garbage.

Q.Find the correlation : (5M)

16. Bread : Baker's yeast : : Soya sauce : ----------

Ans : Aspergillus oryzae.

17. Coffee : Caffea Arabica : : cocoa : ----------

Ans : Teobroma Cacao.

18. Oil Silck : Alcanovorax : Rubber from garbage : ----------

Ans : Actinomycetes.

19. Coversion of metals into comounds : Thiobacilli : : Conversion of uranium salts : ----------

Ans : Geobacter

20. Vancomycin : Antibiotic : : Spinosad : ----------

Ans : Biopesticide.

Q. Answer the following in one sentence : (1 M each)

21.What is studies in applied microbiology ?

Ans : Applied microbiology is the science in which studies related to enzymes of some prokaryotes and eukaryotic microbes, their proteins, applied genetics, molecular biology, etc. is undertaken.

22. What is kefir?

Ans : Kefir is the curd like food products mode form shop milk.

23. What is the function of streptococcus thermophiles during the preparation of yoghurt?

Ans : Streptococcus forms the lactic acid that make the proteins to gel out forming the thicker consistency of the yoghurt.

24.How is vegetarian cheese made?

Ans : The enzyme protease that is obtained from fungi is used to make vegetarian cheese.

25. How is ethanol formed?

Ans : Ethanol is an alcohol which is obtained by fermentation of carbon compunds like fruit juices, maple syrup, sugar molasses, starch of the roots; with the help of yeast Saccaromyces cerevisiae.

26.Which is an effective antibiotic against tuberculosis?

Ans : Rifamycin is an effective antibiotic against tuberculosis.

27. How is soya sauce prepared?

Ans : Soya souce is produced by fermentation of the mixture of flour of wheat or rice and soyabean with the help of the fungus Aspergillus oryzae.

28. Which microbe is used while preparing wine and cider?

Ans : Saccharomyces cerevisiae is used while preparing wine and cider.

29. Write the names of microbial enzymes that you know.

Ans : Some microbial enzymes are oxidoreductases, transferases, hydrolases, lyases, isomerases, ligases, etc.

30. What are emulsifiers? Write the names of emulsifiers?

Ans : Emulsifiers are the substances that make the solution thicker, Polysaccharides and glycolipids are the emulsifiers.

31. What is the function of Xylitol and Aspartame?

Ans : These substances are low calorie artificial sweetners which can be used a sugar substitutes for diabetic persons.

32. Write names of any four antibioatics.

Ans : Some important antibiotics are penicillin, cephalosporins, monobactam, bacitracin, erythromycin, gentamycin, neomycin, streptomyicin, tetracyclins, vancomycin. Etc.

33. How is hydrogen gas released from the water?

Ans : Hydrogen gas is released during biophotolysis of water with the help of bacteria that perform the process of photo reduction.

34. For which bacterial species, sulphuric acid is the source of energy ?

Ans : Sulphuric acid is a source of energy for some species of bacteria like acidophillum spp. And acidobacillus ferroxidens.

35. There is oil layer on the water surface of river in your area. What will you do?

Ans : If there is an oil layer on the water surface, we shall use hydrocarbonoclasic bacteria like pseudomonas to clean up the oil spil.

36. What is the biodegradable plastic made up of?

Ans : Biodegradable plastic made up of polylactic acid.

37. What is the function of microbes in the inoculants?

Ans : Microbes in the inoculants supply the nutrients and there by help in the growth of the plants. This increases the quality of food.

38. Microbial enzymes are used instead of chemical catalysts in chemical Industry. Give scientific reason. (2M)

Ans : Instead of using chemical catalysts in the chemical industry, using microbial enzymes is beneficial for the following reasons.

- Microbial enzymes are active at low temperature, ph and pressure.
- Due to this property, The energy is saved. The costlier erosion-Proof instruments need not be used.

- In enzymatic reactions, the unnecessary by products are not formed as the reactions are highly specific.
- The expenses on purification of the product are minimized as no unnecessary products are formed.
- The elimination and decomposition of waste material is avoided and enzymes can be reused again. Hence, microbial enzymes are said to be eco-friendly.

39. How does the bread become spongy? (2M)

Ans : When the dough for bread is prepared, the baker's yeast – Saccharomyces cerevisiae is added to it.

- This yeast carries out anaerobic fermentation.
- This results in formation of CO2 and ethanol.
- The co2 formed tries to escape out of the flour and thus the dough rise. When such dough is baked, it produces spongy bread.

40.How the bread and other products produced using baker's yeast are nutritions? (4M)

Ans : In order to make the bread the baker's yeast – Saccharomyces cerevisiae is added to the flour for the fermentation process.

- In commercial bakery, compressed yeast is used while in domestic settings dry, granular form of yeast is used.

- The flour prepared by using commercial yeast contains various useful contents like carbohydrates, fats, proteins, various vitamins, and minerals.
- The anaerobic fermentation also increases the nutritive content of the flour.
- Due to this, bread and other products produced with the help on yeast become nutritive.

41. Answer the following questions : (3M)

a) What is clean technology?

b) Why is it essential to ban plastics bags?

Ans : a) Clean Technology is the method to use microbes for controlling air, soil and water pollution. These microbes can degrade the manmade chemicals.

b) plastic is non-biodegradable substance. It cannot be degraded back into its originals constituents. It remains just like that for many hundreds of years. It causes solid waste pollution in any environment wherever it is thrown indiscriminately,.

- if dumped in landfills it obstructs the other decomposition processes.

- If thrown in water bodies, it causes harm to aquatic life. Cattle graze on plastic unknowingly and are killed by it as it clogs inside their alimentary canal. The gutters and rain water drains

get clogged due to plastic bags and this causes cities to submerge in water during heavy rains.

- Nowadays, the fishermen get more than half of plastic if they cast net in the sea. People use the plastic begs indiscriminately without any though towards their environmental impact. There are better alternatives for plastic bags such as cloth bags which can be reused again and again.

- Therefore, it is absolutely necessary to ban the use of plastic bag.

42. Explain the importance of bio pesticides in organic farming. (4M)

Ans : By using bio pesticides, Soil pollution is minimized. Otherwise by using chemical pesticides and fertilizers there is large scale soil pollution.

- When chemical pesticides are used in agriculture, there is contamination of soil by fluoroacetamide-like chemicals.
- These are harmful to other plants, animals as well as for human beings. They may cause skin diseases in humans.
- By using bacterial and fungal toxins the pests and pathogens can be destroyed. Such toxins are directly incorporated in the plant materials.
- E.g Spinosad is a biopesticide produced as by product of fermentation.

43. What are the benefits of mixing ethanol with petrol and diesel? (4M)

Ans : When only diesel or petrol is used as fuel, there is increased air pollution. Moreover, since these are non-renewable and exhaustible fuels, they will be finished in next some years.

- When petrol and diesel is mixed with ethanol, the proportion of CO2, CO, and hydrocarbons which are emitted in the atmosphere becomes lesser.
- The particulate pollutants which otherwise are emitted through combustion of petrol and diesel are not formed when fuels are mixed with ethanol.
- By adding ethanol to the fuels, the cost of expensive petrol or diesel also becomes less. The ethanol burns more efficiently hence ethanol is mixed with petrol and diesel.

44. Which precautions are necessary for proper decomposition of domestic waste? (4M)

Ans : The domestic waste should be properly segregated into biodegradable (wet waste) and non-biodegradable (dry waste).

- After segregation, these waste should be stored separately into two different containers. The non-biodegradable substances should be either reused or sent for recycling.
- The biodegradable substances are decomposed naturally.
- The decomposition process can be done at house hold level too in a pot or a tank.
- This decomposition will yield a rich mature. The pot should be covered by a thin layer of soil and it should be kept in a dark but airy place.
- The Non-biodegradable things such as plastics articles, glass pieces, metal objects, unused medicines, e-waste should never be thrown in wet wastes.
- The toxic substances and the insecticides if added to wet waste, will never allow the natural decomposition process.
- Therefore, only after taking proper precautions we can aim at proper decomposition of domestic wastes.

45. How can the soil polluted by acid rain by made fertile again? (4M)

Ans : The soil polluted by the acid rain is made fertile again by using bacteria.

- Acidophillium spp. And Acidobacillus ferroxidens are the bacteria which have the capacity to use sulphuric acid as their energy source.

- Since this sulphuric acid is present in the acid rain, the bacteria become the right choice to control the same.
- In this way, bacteria can control the soil pollution occurring due to acid rain, making the soil fertile again.

46. What is the role of microbes in compost production?(2M)

Ans : Microbes can bring about natural decomposition of the organic compounds.

- During the biodegradation, some bacteria and fungi bring about such decomposition and release the inorganic constituents back into the nature.
- Compost is formed in such a way by recycling process.

47. Which fuels can be obtained by microbial process? Why it is necessary to increase the use of such fuels? (4M)

Ans : Microbial anaerobic decomposition of urban agricultural and industrial waste forms the gaseous fuel in the form of methane gas.

- Alcohol is another clean form of energy which is used in the form of ethanol. It is obtained by the fermentation of molasses by treating it with saccharomyces yeast.
- By photoreduction of water with the help of bacteria, hydrogen gas is released in the process of bio-photolysis of water. This hydrogen gas is said to be the fuel of the future.

- The conventional fuels are exhaustible. After few hundred years, they will be over completely. Moreover, these fossil fuels cause lot of air pollution due to emission of carbon dioxide. The fuels obtained by the microbial processes are not polluting. Therefore, it is necessary to increase the use of eco-friendly fuels.

48. Write short note on Land-Filling sites. (4M)

Ans : In the land-filling sites the degradable wastes are transferred. Usually such sites are in urban areas.

- The land-filling sites are away from the residential areas for the hygienic reasons. Here large pits are dug in open spaces.
- These pits are lined with plastic sheets. Therefore, the leaching of toxic and harmful materials is avoided to reduce the chance of soil pollution due to leachates.
- Compressed waste is put in the pit and is covered with layers of soil, saw dust, leafy waste.
- Specific biochemical substances are added for speedy decomposition.
- Bioreactors which are mixtures of bacteria are mixed at some places.
- Soil microbes and other top layers decompose the waste.
- Soil slurry is used to seal the pits completely.

- After a certain period, best quality compost is formed. Such land filling sites can be reused after removal of compost.

49. Why it is asked to segregate wet and dry waste in each home? (2M)

Ans : The wet waste decomposes on its own as most of the matter therein is biodegradable. This waste can be converted into manure by composting.

- The dry waste can be picked up by the bhangarwala or kabadiwala.
- This waste can be reused or recycled.
- Therefore, if dry and wet wastes are kept separately, the solid waste management becomes much easier, on the contrary if everything is dumped indiscriminately; it adds to the total volume of solid wastes this becomes unmanageable.
- Therefore, to reduce the problems of solid waste management, the dry and wet waste segregation must be done at every point source. This also could fetch wealth from waste.

50. Which functions are performed by enzymes secreted in human digestive system? Also give names of some such enzymes. (4M)

Ans : Different enzymes secreted by the glands associated with the digestive system, helps in the digestion of the food.

- The complex food components are broken down to simple absorbable substances due to the enzymatic action.
- The pepsin and renin secreted by the stomach ; amylase, trypsin and lipase secreted by the pancreas and peptidases and other enzymes secreted by the intestinal glands un the small intestine are the enzymes which bring about catalytic activity and help in the digestion.