

51. The drug streptomycin inhibits the process of  
[MP PMT 1996]  
(a) Prokaryotic translation (b) Eucaryotic translation  
(c) Prokaryotic transcription (d) Eucaryotic transcription
52. Which one of the following is the correctly matched pair of a product and the microorganism responsible for it  
[AIEEE Pharmacy 2004]  
(a) Ethyl alcohol – *Yeast*  
(b) Acetic acid- *Lactobacillus*  
(c) Cheese - *Nitrobacter*  
(d) Curd - *Azotobacter*
53. *Streptococcus thermophilus* and *Lactobacillus bulgaricus* are being used for the production of  
[MP PMT 1997]  
(a) Cheese (b) Yoghurt  
(c) Tempeh (d) Miso
54. Which one of the following pairs is **not** correctly matched  
[CBSE PMT 2004]  
(a) *Spirulina* - Single cell protein  
(b) *Rhizobium* - Biofertilizer  
(c) *Streptomyces* - Antibiotic  
(d) *Serratia* - Drug addiction
55. Antibiotics belong to the category of  
[MP PMT 2000, 04]  
(a) Steroids (b) Toxins  
(c) Medicines (d) Tonics
56. Which one of the following is used in the baking of the bread  
[MP PMT 2004]  
Or  
Baker's yeast is  
[Odisha JEE 2005; AMU (Med.) 2006]  
Or  
The dough used for making bread is fermented by  
(a) *Rhizopus stolonifer*  
(b) *Zygosaccharomyces*  
(c) *Saccharomyces cerevisiae*  
(d) *Saccharomycodes ludwigii*
57. Ethyl alcohol is commercially manufactured from  
[BHU 2004]  
(a) Wheat (b) Grapes  
(c) Maize (d) Sugarcane
58. Which among these are produced by distillation of fermented broth  
(i) Whisky (ii) Wine  
(iii) Beer (iv) Rum  
(v) Brandy  
[NCERT; Kerala PMT 2011]  
(a) (ii) and (iii) alone (b) (i) and (ii) alone  
(c) (iii) and (v) alone (d) (i), (iv) and (v) alone  
(e) (iii) and (iv) alone
59. Antibiotics are mostly obtained from  
[MP PMT 1997; AIEEE Pharmacy 2003]  
(a) Fungi (b) Actinomycetes  
(c) Cyanobacteria (d) Both (a) and (b)
60. Antibiotic flavicin is obtained from  
[MP PMT 1999]  
(a) *Aspergillus flavus* (b) *Aspergillus clavatus*  
(c) *Streptomyces griseus* (d) *Streptomyces fradiae*
61. Which of the molecules listed below is a product of fermentation of glucose by yeast  
[MP PMT 1999; BHU 2008]  
(a)  $(C_6H_{10}O_5)_n$  (b)  $C_2H_5OH$   
(c)  $C_6H_{12}O_6$  (d)  $CH_3OH$
62. The most common substrate used in distilleries for the production of ethanol is  
[CBSE PMT (Pre.) 2011]  
(a) Molasses (b) Corn meal  
(c) Soya meal (d) Ground gram
63. Immobilised enzymes are generally used for bioreactors in  
[AIIMS 2001]  
(a) Batch process (b) Digestive process  
(c) Activation process (d) Continuous process
64. Flemming, Chain, and Florey were awarded the Nobel Prize in 1945 for the discovery of  
[MHCET 2001; Pb PMT 2004; MP PMT 2010; Kerala PMT 2011]  
(a) HIV (b) CT scan  
(c) Penicillin (d) *Staphylococcus*  
(e) Antibodies
65. Which one of the following is a wrong matching of a microbe and its industrial product, while the remaining three are correct  
[CBSE PMT (Mains) 2011]  
(a) *Clostridium butylicum* – lactic acid  
(b) *Aspergillus niger* – citric acid  
(c) *Yeast* – statins  
(d) *Acetobacter aceti* – acetic acid
66. Which of the following is wrongly matched in the given table  
[NEET (Phase-I) 2016]
- |     | Microbe                       | Product       | Application                       |
|-----|-------------------------------|---------------|-----------------------------------|
| (a) | <i>Trichoderma polysporum</i> | Cyclosporin A | Immunosuppressive drug            |
| (b) | <i>Monascus purpureus</i>     | Statins       | Lowering of blood cholesterol     |
| (c) | <i>Streptococcus</i>          | Streptokinase | Removal of clot from blood vessel |
| (d) | <i>Clostridium butylicum</i>  | Lipase        | Removal of oil stains             |

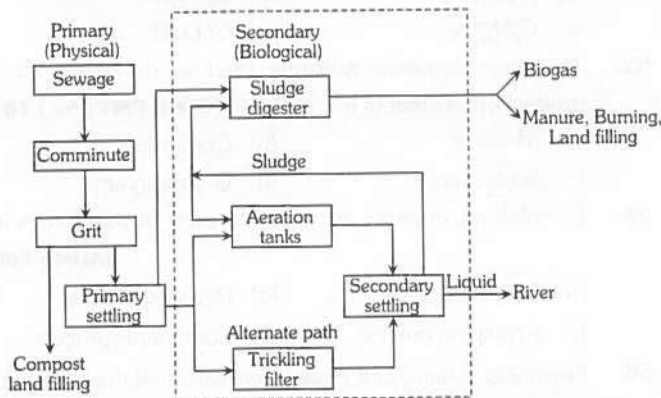
### Sewage Treatment

1. In the sewage treatment, bacterial flocs are allowed to sediment in a settling tank. This sediment is called as  
(a) Inactivated sludge  
(b) Activated sludge  
(c) Primary sludge  
(d) Secondary sludge



## 1462 Microbes in Human Welfare

2. Refer the given flowchart of sewage treatment, accordingly match **Column I** with **Column II** and select the correct answer from the codes given below



[NCERT]

Column I		Column II	
A.	The stage in which physical treatment of sewage is done	(i)	Anaerobic digestion of activated sludge and production of biogas
B.	The stage in which biological treatment of sewage is done	(ii)	Activated sludge
C.	Name of the sediment in primary treatment	(iii)	Aeration tanks
D.	It is carried to aeration tanks from primary settling	(iv)	Primary effluent
E.	Name of the sediment in secondary treatment	(v)	Primary sludge
F.	Site of flocs growth	(vi)	Secondary treatment
G.	Function of sludge digester	(vii)	Primary treatment

- (a) A-(vii), B-(vi), C-(v), D-(iv), E-(ii), F-(iii), G-(i)  
 (b) A-(i), B-(iii), C-(v), D-(vii), E-(ii), F-(iv), G-(vi)  
 (c) A-(i), B-(ii), C-(iii), D-(iv), E-(v), F-(vi), G-(vii)  
 (d) A-(vii), B-(vi), C-(i), D-(ii), E-(iii), F-(iv), G-(v)
3. Study the following statements and select the incorrect ones
- Physical removal of large and small particles through filtration and sedimentation is called primary sewage treatment.
  - Secondary sewage treatment is mainly a mechanical process
  - Activated sludge sediment in a sewage treatment plant is a rich source of aerobic bacteria.
  - Biogas, commonly called as gobar gas, is pure methane.
- (a) (i) and (ii)                      (b) (ii) and (iv)  
 (c) (ii) and (iii)                    (d) (iii) and (iv)
4. Integrated Pest Management (IPM) discourages the excessive use of
- (a) Biological methods              (b) Chemical pesticides  
 (c) Mechanical methods            (d) All of these
5. The large vessels for growing microbes on an industrial scale are called [NCERT]
- (a) Petri dish                          (b) Digestors  
 (c) Biogas vessel                      (d) Fermentors
6. The primary treatment of sewage involves [NCERT]
- (a) Digestion  
 (b) Decomposition  
 (c) Sedimentation and Filtration  
 (d) None of these
7. The amount of oxygen required by the microbes in the decomposition of organic matter is called [NCERT]
- (a) Chemical oxygen demand  
 (b) Biochemical oxygen demand  
 (c) Total oxygen demand  
 (d) Dissolve oxygen
8. During which stage of sewage treatment microbes are used [NCERT]
- (a) Primary treatment              (b) Secondary treatment  
 (c) Tertiary treatment              (d) All of these
9. The solids which settle after primary treatment of sewage are called [NCERT]
- (a) Primary sludge                    (b) Activated sludge  
 (c) Flocs                                (d) Total solids
10. What gases are produced in anaerobic sludge digesters [NEET 2013; CBSE PMT 2014; KCET 2015]
- (a) Methane, hydrogen sulphide and O<sub>2</sub>  
 (b) Hydrogen sulphide and CO<sub>2</sub>  
 (c) Methane and CO<sub>2</sub> only  
 (d) Methane, hydrogen sulphide and CO<sub>2</sub>
11. 'Flocs' refer to
- (a) Masses of bacteria associated with fungal filaments to form mesh-like structure  
 (b) Primary sludge formed in the ETP  
 (c) The remaining part of the sludge  
 (d) 'Biogases' formed from the fermentation of organic wastes
12. A sewage treatment process, in which a part of decomposer bacteria present in the wastes is recycled into the starting of the process is called [AIIMS 2007; DUMET 2009]
- (a) Cyclic treatment  
 (b) Activated sludge treatment  
 (c) Primary treatment  
 (d) Tertiary treatment
13. The purpose of biological treatment of waste-water is to [AMU (Med.) 2010]
- (a) Reduce BOD                      (b) Increase BOD  
 (c) Reduce sedimentation          (d) Increase Sedimentation
14. Which of the following in sewage treatment removes suspended solids [NCERT; NEET 2017]
- (a) Tertiary treatment              (b) Secondary treatment  
 (c) Primary treatment              (d) Sludge treatment



# NCERT

## Exemplar Questions

- Activated sludge should have the ability to settle quickly so that it can [NCERT]
  - Be rapidly pumped back from sedimentation tank to aeration tank
  - Absorb pathogenic bacteria present in waste water while sinking to the bottom of the settling tank
  - Be discarded and anaerobically digested
  - Absorb colloidal organic matter
- Wastewater treatment generates a large quantity of sludge, which can be treated by [NCERT]
  - Anaerobic digesters
  - Floc
  - Chemicals
  - Oxidation pond
- Match the following list of bacteria and their commercially important products
 

Bacterium	Product
A. <i>Aspergillus niger</i>	i. Lactic acid
B. <i>Acetobacter aceti</i>	ii. Butyric acid
C. <i>Clostridium butylicum</i>	iii. Acetic acid
D. <i>Lactobacillus</i>	iv. Citric acid

Choose the correct match [NCERT]

  - A-ii, B-iii, C-iv, D-i
  - A-ii, B-iv, C-iii, D-i
  - A-iv, B-iii, C-ii, D-i
  - A-iv, B-i, C-iii, D-ii
- Match the following list of bioactive substances and their roles
 

Bioactive Substance	Role
A. Statin	i. Removal of oil stains
B. Cyclosporin A	ii. Removal of clots from blood vessels
C. Streptokinase	iii. Lowering of blood cholesterol
D. Lipase	iv. Immuno-suppressive agent

Choose the correct match [NCERT]

  - A-ii, B-iii, C-i, D-iv
  - A-iv, B-ii, C-i, D-iii
  - A-iv, B-i, C-ii, D-iii
  - A-iii, B-iv, C-ii, D-i
- Big holes in Swiss cheese are made by a [NCERT]
  - A machine
  - A bacterium that produces methane gas
  - A bacterium producing a large amount of carbon dioxide
  - A fungus that releases a lot of gases during its metabolic activities
- BOD of waste water is estimated by measuring the amount of [NCERT]
  - Total organic matter
  - Biodegradable organic matter
  - Oxygen evolution
  - Oxygen consumption

- Which one of the following alcoholic drinks is produced without distillation [NCERT]
  - Wine
  - Whisky
  - Rum
  - Brandy
- What would happen if oxygen availability to activated sludge flocs is reduced [NCERT]
  - It will slow down the rate of degradation of organic matter
  - The center of flocs will become anoxic, which would cause death of bacteria and eventually breakage of flocs
  - Flocs would increase in size as anaerobic bacteria would grow around flocs
  - Protozoa would grow in large numbers

## Critical Thinking

### Objective Questions

- Which of the option shows following example in ascending order in terms of BOD [GUJCET 2014]
  - Distilled water
  - Tap water
  - Sewage wastes drained in river
  - i - ii - iii
  - ii - i - iii
  - iii - i - ii
  - iii - ii - i
- Broad spectrum antibiotic is that which
  - Acts on both pathogens and hosts
  - Acts on all bacteria and viruses
  - Acts on a variety of pathogenic micro-organisms
  - Is effective in very small amounts
- Antibiotics inhibit the growth of or destroy
  - Bacteria and fungi
  - Bacteria and viruses
  - Bacteria, algae and viruses
  - Bacteria, fungi and viruses
- The fruit juices turn bitter in taste if they are kept in open place for sometime, because of
  - Bacteria of the atmosphere react with the juice
  - Fermentation of the juice by yeast
  - Some internal factors
  - All the above three statements are correct
- Which one of the following pairs is wrongly matched [CBSE PMT 2007]
 

(a) Methanogens	-	Gobar gas
(b) Yeast	-	Ethanol
(c) Streptomycetes	-	Antibiotic
(d) Coliforms	-	Vinegar





## Assertion & Reason

Read the assertion and reason carefully to mark the correct option out of the options given below :

- (a) If both the assertion and the reason are true and the reason is a correct explanation of the assertion  
 (b) If both the assertion and reason are true but the reason is not a correct explanation of the assertion  
 (c) If the assertion is true but the reason is false  
 (d) If both the assertion and reason are false  
 (e) If the assertion is false but reason is true

1. Assertion : Yeasts such as *Saccharomyces cerevisiae* are used in baking industry.

Reason : Carbon dioxide produced during fermentation causes bread dough to rise by thermal expansion. [AIIMS 2003]

2. Assertion : The kneaded flour shows leavening, when yeast is added to it.

Reason : Enzymes secreted by yeast cause leavening.

3. Assertion : Extraction and purification of enzymes is laborious and expensive.

Reason : Protein engineering can be used to produce enzymes at large scale.

4. Assertion : Enzymes application in industry is enhanced by its immobilization.

Reason : Immobilization provides protection to enzymes without affecting their activity.

## Answers

### House Hold Food Processing

1	b	2	d	3	b	4	b	5	d
6	d	7	d	8	a	9	d	10	d
11	a	12	a						

### Industrial Production

1	b	2	c	3	a	4	d	5	b
6	d	7	d	8	b	9	c	10	a
11	d	12	a	13	a	14	b	15	c
16	d	17	b	18	c	19	c	20	d

21	d	22	c	23	a	24	b	25	b
26	d	27	c	28	b	29	c	30	d
31	c	32	d	33	b	34	b	35	d
36	d	37	a	38	c	39	d	40	b
41	b	42	a	43	c	44	b	45	c
46	b	47	b	48	c	49	a	50	d
51	a	52	a	53	b	54	d	55	c
56	c	57	d	58	d	59	d	60	a
61	b	62	a	63	d	64	c	65	a
66	d								

### Sewage Treatment

1	b	2	a	3	b	4	b	5	d
6	c	7	b	8	b	9	a	10	d
11	a	12	b	13	a	14	c		

### NCERT Exemplar Questions

1	a	2	a	3	c	4	d	5	c
6	d	7	a	8	b				

### Critical Thinking Questions

1	a	2	c	3	d	4	b	5	d
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### Assertion and Reason

1	a	2	a	3	b	4	a		
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## Answers and Solutions

### House Hold Food Processing

- (b) In old days, cheese was prepared by using the enzyme "rennet" from the lining of stomach of sheep and goat.
- (d) Lactic acid bacteria acts on lactose which present in milk and converts it into cheese.
- (b) Rennet is obtained from calf stomach and used in the preparation of cheese.
- (d) Cheese is prepared from milk with the help of *Streptococcus lactis*, *S. Cremoris*, *Leuconostoc citrovorum*, *Lactobacillus sp.* etc.
- (a) The dough which is used for making foods such as dosa, idli, jalebi, biscuits and bread etc. are fermented by bacteria or yeast (*Saccharomyces cerevisiae*). The puffed-up appearance of dough is due to the production of CO<sub>2</sub> gas. Bacteria are present in the atmosphere and the yeast has to be added to the dough.





12. (a) Large holes in the swiss cheese are due to production of large amount of  $\text{CO}_2$  by a bacterium named *Propionibacterium sharmanii*. The Roquefort cheese is ripened by growing a specific fungus on them, which gives them a particular flavour.

### Industrial Production

6. (d) Lactic acid is produced from microbial fermentation of lactose (milk sugar). Fermenting agents are bacteria, e.g., *Streptococcus lactis* and *Lactobacillus* and fungi, e.g., *Rhizopus*.
7. (d) The term 'antibiotic' was given by Waksman (1942).
8. (b) Vinegar is most important acid being produced by two step fermentation of sugarcane juice by yeast and *Acetobacter bacilli* bacteria. Ascorbic acid (vitamin C) is produced by a complicated modification of glucose by different species of *Acetobacter*.
9. (c) First antibiotic isolated was penicillin (wonder drug), from *Penicillium notatum*.
12. (a) *Bacillus eubacteriales* / simple bacteria is main source (about 70%) of antibiotics production and 30% antibiotics produced from pseudomonas.
15. (c) Gluconic acid is produced, during glucose oxidation by most *Aspergillus* spp. and citric acid is obtained by the fermentation of sugar syrup by *Aspergillus niger*.
17. (b) Streptomycin is produced from *Streptomyces griseus*. Streptomycin inhibits the bacterial protein synthesis by affecting 30S subunit of ribosome.
20. (d) Payen and Persoz in 1933 identified diastase for the first time.
21. (d) By cross linking enzyme molecules or by covalently attaching them to a solid support or by entrapping them in gel, metabolic activities of enzymes are stopped.
22. (c) Beer is produced from *Hordeum vulgare* (barley seed) malt and alcohol content is 4-8%.
23. (a) Common food yeast is *Torulopsis utilis*. It is cultured over molasses and starchy materials like Potato at 5 pH.
24. (b) First organic acid (lactic acid) to be fermented, which obtained by the activity of a number of bacteria like *Streptococcus lactis*, *Lactobacillus delbreukii*, and *Rhizopus* fungus.
26. (d) This vitamin is now being produced during fermentation by *Propioni* bacteria (bacteria which synthesize propionic acid) and certain strains of *Pseudomonas*.
28. (b) First antibiotic penicillin from blue - green fungus *Penicillium notatum* in agar - agar medium, discovered by Sir Alexander Flemming in 1928.
31. (c) Cheese and yoghurt is nutritive product of milk which is formed by fermentation process.
35. (d) Brewing industry produces alcoholic beverages of several types depending upon the fermenting agent and the medium. Fermenting agents are *Saccharomyces cerevisiae*, *S. sake*, *S. ellipsoidens* (wine yeast) and *S. piformis*, (ginger yeast).
36. (d) Statins produced by the yeast *Monascus purpureus* have been commercialised as blood-cholesterol lowering agents. It acts by competitively inhibiting the enzyme responsible for synthesis of cholesterol.

39. (d) Because *Acetobacter aceti* is used in the production of vinegar.

41. (b) Penicillin is obtained from *Penicillium notatum* and *Penicillium chrysogenum*. (Sir Alexander Flemming 1928).

42. (a) Alcohol fermentation is carried out by a number of bacteria and yeast (*Saccharomyces*). The ethanol and carbon dioxide produced by *Saccharomyces* are useless for yeast but useful to humans.

**Acetic acid** is synthesized by the help of *Acetobacter* (bacterium).

**Citric acid**—is produced by the help of fungus *Aspergillus*.

47. (b) *Claviceps purpurea* is a fungus which causes ergotism in rye (*secale cereale*) and other plants. It also yields a hallucinogenic drug called LSD.

48. (c) Neomycin obtained from *Streptomyces fradiae*. It acts against acid-fast and gram negative bacilli but toxic to kidneys and ear.

49. (a) Interferons are active proteins (Antiviral proteins) that are effective against most viruses.

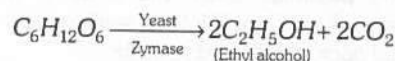
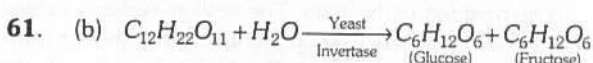
50. (d) Antibiotics are the substances which are produced by micro-organism for killing or inhibiting the growth of micro-organism.

53. (b) Yoghurt / yogurt produced by curdling of milk with the help of *Streptococcus thermophilus* and *Lactobacillus bulgaricus* at 40–46°C for four hours.

56. (c) Invertase enzyme is obtained from *Saccharomyces cerevisiae* and is used to bread baking is also called baker's yeast.

57. (d) Sugarcane (*Saccharum officinarum*) is the main source of commercial ethyl alcohol. Source is extracted from the juice of sugarcane as a commercial product, but this leaves a syrup called molasses which contains glucose and fructose. Ethanol is produced by the fermentation of molasses by using yeast *Saccharomyces cerevisiae*.

59. (d) Antibiotics are obtained from lichens, fungi, eubacteria, actinomycetes.



62. (a) Molasses are used commonly in distilleries for ethanol production

63. (d) Immobilisation of enzymes is the process of fixing enzyme to or enclosing it in a solid support so as to protect it from deactivation and attack from proteases, maintain enzyme purity, ability to recover it after reaction and perform continuous reaction.

### Sewage Treatment

1. (b) Once the BOD is reduced the effluent is then passed into a settling tank where the bacterial flocs are allowed to settle. This sediment is called activated sludge. A small part of the activated sludge is pumped back into the aeration tank to serve as inoculum. Remaining part is pumped into large tanks called anaerobic sludge digesters.





2. (a) Primary treatment remove floating and suspended solids from sewage through filtration and sedimentation. Secondary treatment is purely a biological treatment involving microbial activity. Most of the suspended material get concentrated and settles down. The sedimentation is called the primary sludge and supernatant is called effluent. The effluent is passed through a sedimentation tank where microbial flocs are allowed to settle down. The settled material is called activated sludge. A part of activated sludge is used as inoculum in aeration tank. The remaining is passed into a large tank called anaerobic sludge digester.
3. (b) The stage in which biological treatment of sewage is done is called secondary treatment. Biogas is a mixture of gases containing predominantly methane produced by microorganism. Which may be used as fuel type of gas produced depends on microbes and the organic substrate they utilize. Here the raw material is cellulose and the gases produced are methane along with  $CO_2$  and  $H_2$ .
4. (b) Integrated Pest Management (IPM) promotes minimized pesticide use, enhanced environmental stewardship and sustainable systems. This is achieved by protection of commodities with environmentally and economically sound practices and results in abundant and diverse supplies of food and fibre products.
5. (d) Production of products valuable to human beings on an industrial scale requires growing microbes in very large vessels called fermentors.
6. (c) It involves physical removal of particles – large and small from the sewage through filtration and sedimentation. Sequential filtration removes floating debris, then the grit (soil and small pebbles) are removed by sedimentation. All solids that settle down forms the primary sludge, the supernatant forms the effluent.
7. (b) BOD refers to the amount of oxygen that would consume if all the organic matter in one litre of water is to be oxidized by bacteria. The sewage water is treated till BOD is reduced. The greater the BOD, greater is the polluting potential. Once the BOD is reduced the effluent is then passed into a settling tank where the bacterial flocs are allowed to settle.
8. (b) Secondary treatment / biological treatment the primary effluent is passed into large aeration tanks where it is constantly agitated mechanically and air is pumped into it. This allows vigorous growth of useful aerobic microbes into flocs.
9. (a) All solids that settle down forms the primary sludge the supernatant forms the effluent. The effluent from the primary settling tank is taken for sewage treatment.
10. (d) Marsh gas or Methane gas is mainly produced by the activities of anaerobic bacteria on sewage. Sewage contains large amounts of organic matter and microbes (bacteria and fungi) are digested during secondary treatment process of sewage by anaerobic bacteria. During digestion bacteria produce a mixture of gases such as methane, hydrogen sulphide and carbon dioxide.
11. (a) The primary effluent is passed into large aeration tanks where it is constantly agitated Mechanically and air is pumped into it. This allows vigorous growth of useful aerobic microbes into flocs (Masses of bacteria associated with fungal filaments to form mesh like structure). While growing, these microorganisms consume the major part of the organic matter in the effluent.

### Critical Thinking Questions

1. (a) Domestic sewage mostly contains biodegradable organic matter which readily decompose by micro organisms for biodegradation of organic matter. Micro organism consume lot of  $O_2$ , resulting sharp decline of dissolved  $O_2$  in river/ water body. Thus BOD will increase.
2. (c) It is an antibiotic which can kill or destroy a number of pathogens that belong to different groups with different structure and cell wall composition.
3. (d) Clinically, an antibiotic is a substance produced by a micro-organism which in low concentration inhibits the growth and metabolic activity of pathogenic organisms without harming the host cell.

### Assertion and Reason

1. (a) Bakers yeast (*Saccharomyces cerevisiae*) is added to flour during kneading. Yeast secretes enzymes like amylase (change some starch to maltose), maltase (maltose to glucose) and zymase (glucose to ethyl alcohol and  $CO_2$ ). Leavened dough is baked and both alcohol and  $CO_2$  evaporate. The bread becomes soft and porous.
2. (a) A small quantity of yeast is added to wheat flour. The same is kneaded. The kneaded flour is kept at a warm temperature for a few hours. It swell up. The phenomenon is called leavening. Leavening is caused by secretion of three types of enzymes by yeast. They are amylase, maltase and zymase.
3. (b) Although thousands of proteins have been characterized in prokaryotes and eukaryotes, only few became commercially important. This is due to the high cost of isolating and purifying enzymes in sufficient quantities. Through recombinant DNA technology, a protein can be obtained in abundant quantity the objectives of protein engineering are to create superior enzymes to catalyze production of high value specific chemicals and to produce enzymes for large scale use.
4. (a) An immobilized enzyme is physically entrapped or covalently bonded by chemical means to an inert and usually insoluble matrix, where it can act upon its natural substrate. The matrix is usually a high molecular weight polymer such as polyacrylamide, cellulose, starch, glass, beads, etc. Because of its binding with a matrix the immobilized enzyme has better stability in many cases. Efficiency of immobilized enzyme is better. The enzyme can be recovered at the end of the reaction and can be used repeatedly.





## Microbes in Human Welfare

## SET Self Evaluation Test

- The application of microbial metabolism to transform simple raw materials into valuable products is [MP PMT 1993]
  - Biocatalysis
  - Genetic engineering
  - Tissue culture
  - Fermentation
- For rapid production of alcohol, immobilised yeast cells are kept in
  - Silica gel
  - Wire netting
  - Porcelain columns
  - Calcium alginate beads
- Enzyme which has the fibrinolytic effect is
  - Protease
  - Amylase
  - Lipase
  - Streptokinase
- Under the 'Ganga and Yamuna action plans'
  - It is proposed to build a large number of sewage treatment plants so that only treated sewage may be discharged in the rivers
  - The river water is treated with potassium permanganate and bleaching powder so that it is cleaned of microbes
  - The river water to be considered sacred so that bathing and adding pollutants is not allowed
  - Addition of effluents is banned in rivers
- Microorganisms contribute in human welfare in the following fields
  - Fermentation
  - Fermentation and decomposition
  - Decomposition, fermentation and retting
  - Causing pathogenicity
- Enzymes used in synthesis of jams and jellies are
  - Pectinases and proteases
  - Streptokinases
  - Lipases
  - Amylases and Lipases
- Why is the gas produced in a biogas plant and fermentation process of dough in bakery different
  - As because the microorganisms are different
  - As the raw material is different
  - Both microorganisms and the raw material are different
  - Both the processes are completely different
- The 'clot buster' produced by *Streptococcus* and modified by genetic engineering is [Kerala PMT 2012]
  - Streptokinase
  - Penicillin
  - Strepsils
  - Cyclosporin A
  - Stains

## AS Answers and Solutions

1	d	2	c	3	d	4	a	5	c
6	a	7	c	8	a				

- (d) Streptokinase (Tissue plasminogen activator or TPA) is an enzyme obtained from the cultures of some haemolytic streptococci. It has fibrinolytic effect. Therefore it helps in clearing blood clots inside the blood vessels.
- (a) The ministry of environment and forests has initiated Ganga action plan and Yamuna action plan to save these major rivers from getting polluted. Under these plans it is proposed to build a large number of sewage treatment plants so that only treated sewage water is discharged in those rivers.

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