8. Cell Biology and biotechnology

1. Fill in the blanks and complete the Statement.
(1) Methods like artificial insemination and embryo transplant are mainly used for **Animal husbandry.**
(2) **Stem cell research** is the revolutionary event in biotechnology after cloning.
(3) The disease related with the synthesis of insulin is **diabetes.**
(4) Government of India has encouraged the **Pisciculture** for improving the productivity by launching NKM-16.

2. Match the pairs. (Answers are given directly.)
(1) Interferon - Viral infection
(2) Factor VIII - Haemophilia
(3) Somatostatin - Dwarfness
(4) Interleukin – Cancer

3. Rewrite the following wrong statements after corrections.
a. Changes in genes of the cells are brought about in non-genetic technique
Ans. Non-genetic biotechnology involves use of either cell or tissue.

b. Gene from Bacillus thuringiensis is introduced into soybean.
Ans. Gene from Bacillus thuringiensis is introduced with gene of cotton.

4. Write short notes.
(1) Biotechnology: Professional uses.
Ans. (1) Biotechnology can be used in the following professional fields, viz.crop biotechnology, animal husbandry, human health, etc.
(2) In crop biotechnology, improvement in the field and variety of agricultural field is done. The hybrid seeds, genetically modified crops, herbicide tolerant plants are some of the areas in which lot of biotechnological research is being done. By such research, high yielding and disease resistant varieties and varieties which can tolerate stresses such as alkalinity, weeds, cold and drought etc. are produced. BT cotton, BT Brinjal and golden rice are some GMO plants which have become popular in India. Due to herbicide tolerant plants, the weeds are now selectively destroyed. By using biofertilizers, the use of chemical fertilizers is reduced. Use of bacteria such as Rhizobium, Azotobacter, Nostoc, Anabaena and plants like Azolla the nitrogen fixation and phosphate solubilization abilities of the plants are improved.
(3) Animal husbandry is now using the methods of artificial insemination and embryo transfer by which the breeds of cattle are improved.
(4) To improve and to manage the human health, diagnosis and treatment of diseases have to be focussed. Diagnosis of diabetes, heart diseases and infectious diseases such as AIDS and dengue can be done rapidly due to biotechnology.
(5) The treatment and prevention of diseases need hormones, interferons, antibiotics and different vaccine which are now manufactured through biotechnology. Gene therapy is also used to treat hereditary disorders.
(6) Industrial products and clean technology to combat environmental pollution uses

biotechnology practices.
(7) DNA fingerprinting has revolutionized the profession of forensic science.

(2) Importance of medicinal plants.
Ans. (1) In Ayurveda practices, the natural remedies were used. Since India had great biodiversity and traditional knowledge of herbal medicinal uses, therefore, people depended on such medicinal plants.
(2) In olden days, such herbs were collected by roaming in the jungles.
(3) Such important medicinal cultivated with care. Herbs are now
(4) In entire world people have understood the importance of holy basil (tulsi), Adulsa, Jyesthmadh, etc.
(5) In some of the allopathy medicines to, the plant extracts are used.
(6) Medicines made from harmful chemicals have side effects and are not safe to be used unless there is medical supervision. Therefore, world wide herbal remedies are gaining more popularity

5. Answer the following questions in your own words.
a. Which products produced through biotechnology do you use in your daily life?
Ans. (1) The simplest use of biotechnology that we practice at home is making curd and buttermilk
(2) The primary type of biotechnology is used in the process of fermentation while making food stuffs, like bread, idli dosa, dhokla, etc.
(3) Nowadays, different types of cheese, paneer, yoghurt, energy drinks etc, are produced with the help of biotechnology. We are consuming these in our daily life
(4) Seedless grapes, papaya, and watermelons are available in the market these days.
(5) Violet cabbage, yellow capsicum and exotic vegetables used for salad are also biotechnology products.
(6) The vaccines, antibiotics and the injections of human insulin are in regular use in many house holds.

b. Which precautions will you take during spraying of pesticides?
Ans. (1) Pesticides are toxic chemicals, By using them indiscriminately, they contaminate the water, soil and also crops.
(2) The D.D.T., chlorpyrifos and malathion are very dangerous. They spread through the food chain causing biomagnification
(3) Therefore, we shall not use such insecticides and pesticides. We shall use organic pesticides. Excessive use will be avoided.
(4) At the time of spraying, nose, eyes and skin will be covered and protected,
(5) Care will be taken not to allow children or domestic animals to come in contact with an pesticide.

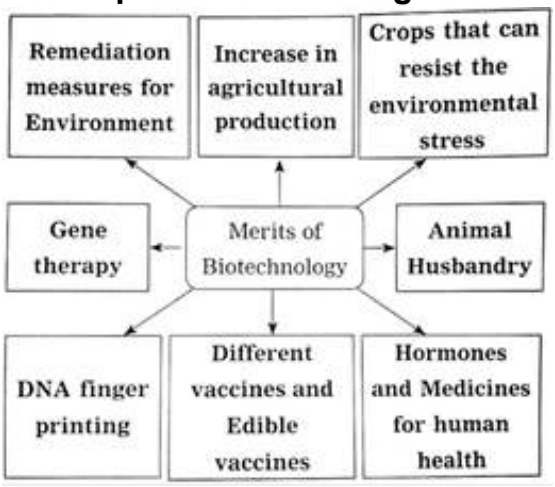
c. Why some of the organs in human body are most valuable?
Ans. (1) The body can be in best health if all the vital organs of the body are also in best condition.
(2) Brain, kidney, heart, liver, etc. are some such vital organs which are most essential for proper metabolism and functioning of the body. The sense organs of the body are also of

utmost importance, especially eyes.
(3) One cannot survive if any of these vital organs are not functioning properly. Some of the organs like brain will never regenerate too.
(4) Some of the organs can be brought back to functionality by performing surgeries. However, any problem with these vital organs make the life miserable, therefore, they are said to be valuable.

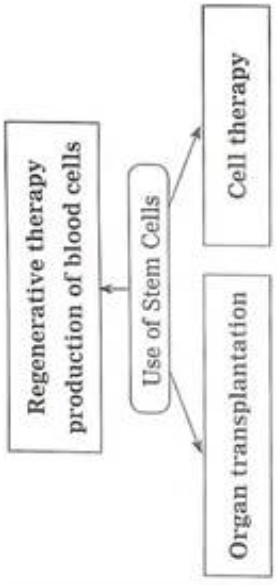
d. Explain the importance of fruit processing in human life?
Ans. (1) Fruits are perishable food stuff. They are spoilt soon if not consumed immediately. Hence for storage and usage for a long term, their preservation is absolutely essential.
(2) For year-long use of the fruits they are dried, salted, packed in air tight containers, used for preparing jams and jellies or condensed into pulps or syrups. Beverages, pickles, sauce, and various other products made from the fruits are largely used by us.
(3) The preserved products also fetch financial benefits.
(4) In national and international markets, Indian fruits like mangoes are in great demand. We can get foreign currency through exports of fruits and fruit products. The local horticulturists get good benefit from their orchards.
(5) Processed fruit products also gives vitamins and minerals that help in maintaining good health. Thus the fruit processing is important for the human life.

e. Explain the meaning of vaccination.
Ans. (1) Vaccination is the administering of vaccine. Vaccine is the 'antigen', given to a person or even to animals for acquiring immunity against particular pathogens or diseases.
(2) In olden days, vaccines were prepared with the help of completely or partially killed pathogens.
But this method causes some inconvenience. Some persons were allergic to such raw vaccines or they contracted the same disease through such vaccines.
(3) Hence in recent times the vaccines are produced by using biotechnology. These vaccines are artificial which are synthesised in the laboratories.
(4) The antigen is produced with the help of gene of the pathogen. Such vaccine becomes safe for administering
(5) These antigenic proteins are injected to people to make their immune systems strong. This process of vaccination is absolutely safe. The vaccines are more thermostable and active for a long period of time.

6. Complete the following chart.



7. Write the correct answer in blank circles.



8. Identify and complete the following correlations.

a. Insulin : Diabetes :: Interleukin:

Ans. Cancer

b. Interferon : - Erythropoietin: Anemia.

Ans. Viral infection

c. ------- : Dwarfness :: Factor VIII Hemophilia.

Ans. Somatostatin

d. White revolution : Dairy :: Blue revolution :

Ans. Fishery

9. Write a comparative note on usefulness and harmfulness of biotechnology

Ans. (1) Biotechnology has proved to be useful in the field of agriculture, medicine, clean technology and industrial products.

(2) Due to various biotechnological experiments the food production is increased substantially.

The milk and milk products are now freely available People no longer die of hunger due to abundant food supply.
(3) The sophisticated vaccines have stopped the spread of epidemics.
(4) The diseases like diabetes can be controlled due to human insulin injections that can be manufactured by biotechnology.
(5) The problems of pollution control, solid waste management and fuels are partially tackled by biotechnological alternatives.
(6) Though all such positive aspects are there, the biotechnology also poses some problems. The genetic changes are breaking the principles of nature. By inserting human genes in bacteria or virus, the products that are needed only for humans are produced.
(7) Human cloning is also a debatable issue. It will cause social and ethical problems. The new generations formed by cloning will have mothers but no fathers. If man tries to manipulate the genomes of other living organisms, it will cause disturbances in the natural balance. The long term effects of all such genetic manipulations can be disastrous. Thus, according to some views biotechnology can be dangerous too.