Cell Biology & Biotechnology

Exercise

Q. 1. Fill in the blanks and complete the statements.

a. Methods like artificial insemination and embryo transplant are mainly used for _____
b. _____ is the revolutionary event in biotechnology after cloning.
c. The disease related with the synthesis of insulin is _____.
d. Government of India has encouraged the _____ for improving the productivity by launching NKM-16.

Answer : a. Methods like artificial insemination and embryo transplant are mainly used for **animal husbandry**.

Artificial insemination and embryo transplantation is done to produce improved variety of cattle and poultry for better products such as milk, meat and eggs, etc.

b. Stem cell research is the revolutionary event in biotechnology after cloning.

Stem cell research is brings about fundamental changes in the medical science. Stem cells are used to replace the dead cells in case of conditions like diabetes, myocardial infarction, Alzheimer's disease, Parkinson's disease. Organ transplantation can be done with the help of stem cells.

c. The disease related with the synthesis of insulin is **diabetes**.

The glucose level in the blood is increased due to less secretion of insulin. This condition is called diabetes. The hormone insulin is prepared with the help of bacteria, is used to treat diabetes.

d. Government of India has encouraged the **Neel-Kranti Mission-2016** for improving the productivity by launching NKM-16.

(NKM-16) or 'Neel-Kranti Mission-2016 is a programme started by the Indian government to increase the production of fish other fishery products such as shrimp and lobsters.

Q. 2. Match the pairs.

a. Interferon	1. Diabetes
b. Factor	2. Dwarfness
c. Somatostatin	3. Viral infection
d. Interleukin	4. Cancer
	5. Hemophilia

Answer :

Column A	Column B
Interferon	Viral infection
Factor	Hemophilia
Somatostatin	Dwarfness
Interleukin	Cancer

Dwarfism or short stature, occurs when an organism is extremely small. In humans, an adult height of less than 4 feet 10 inches. Somatostatin checks the production of growth hormones, causing dwarfism.

Factor VIII deficiency causing hemophilia A. our body needs Factor VIII (factor 8) substances that form a clot.

Interferon is a protein released by the body cell in response to the entry of a virus, which has the property of inhibiting virus multiplication.

Interleukin is a g proteins that regulate cell growth, differentiation, and motility. It is used against cancer.

Q. 3. Rewrite the following wrong statements after corrections.

a) Changes in genes of the cells are brought about in non-genetic technique.
b) Gene from Bacillus thuringiensis is introduced into soyabean.

Answer : a) Changes in genes of the cells are brought about in genetic engineering.

Genetic engineering is the process of modifying the genetic makeup of an organism. Modifications in the genetic makeup can be generated by methods such as *gene* targeting, nuclear transplantation, synthetic chromosomes or viral insertion. For example, Insulin can made with the help of bacteria by modifying its gene.

b) Gene from *Bacillus thuringiensis* is introduced into cotton.

A gene had been isolated from the bacterium *Bacillus thuringiensis* and is mixed up with the gene of cotton. This gene controls boll worm insects which attacks cotton plants.

Q. 4. A. Write short notes.

Biotechnology: Professional uses.

Answer : Biotechnology is used professionally in the field of:

1. Agriculture.

2. Animal husbandry

3. Human health

4. Industrial Products

5. Environmental issues

6. Food biotechnology

7. DNA fingerprinting

1. Genetically Modified Crops such as tomatoes, brinjal, golden rice, hybrid seeds, BT cotton, and disease resistant plants are commercially produced through biotechnology.

2. Artificial insemination and embryo transfer are used in animal husbandry to improve both, the quantity and quality of animal products. For example milk, meat, wool, eggs etc.

3. Biotechnology helps to identify the role of gene in disease of a person. Diagnosis and treatment of diabetes and heart diseases has become possible. Examples Biotechnology is useful for production of hormones like insulin, somatotropin, and interferon.

4. Various industrial chemicals can be produced through less expensive processes.

Example: Alcohol production from sugar.

5. It has become possible to solve environment related various problems with the help of biotechnology, for example treatment of sewage and solid waste.

6. Food Biotechnology: Food items like bread, cheese, wine, beer, yoghurt, vinegar are produced with the help of biotechnology.

7. DNA fingerprinting is another use of biotechnology, useful in forensic sciences in identifying criminals.

Q. 4. B. Write short notes.

Importance of medicinal plants.

Answer : The **medicinal plant** include various types of plants which are used for medicinal purposes.

● Plants such as black pepper, cinnamon, aloe, sandalwood, ginseng, and safflower are used to heal wounds, sores and boils.

● Some plants such as Basil, Fennel, Chives, Cilantro, Apple Mint, Thyme, Golden Oregano, Variegated Lemon Balm, Rosemary can be planted in kitchen garden. These herbs are easy to grow, look good, taste and smell amazing and many of them are magnets for bees and butterflies.

● Many herbs are used as blood purifiers by removing to alter or change toxins of the body. These are also known as 'blood cleansers'.

● Some plants have antibiotic properties. Turmeric is useful in inhibiting the growth of germs, harmful microbes and bacteria.

● To reduce fever certain antipyretic plants such as *Chirayta*, black pepper, sandal wood and safflower are recommended by traditional Indian medicine practitioners.

Q. 5. A. Answer the following question in your own words.

Which products produced through biotechnology do you use in your daily life?

Answer : There are many products produced through biotechnology we use our daily life. Some of the products are listed below:

Corn

Papaya

Golden rice

Brinjal Cauliflower

Q. 5. B. Answer the following question in your own words.

Which precautions will you take during spraying of pesticides?

Answer : While using pesticides the following precautions to taken:

● Always protect your nose, eyes, mouth, ears and hands.

● Apply only at recommended dose.

● Do not apply on hot sunny day or strong windy condition.

● Do not apply just before the rains and also after the rains.

● Do not apply against the wind direction.

● Containers, buckets etc. used for mixing pesticides should not be used for domestic purposes.

● Avoid entry of animals and workers in the fields immediately after spraying.

● Never re-use empty pesticide container for any purpose

Q. 5. C. Answer the following question in your own words.

Why some of the organs in human body are most valuable?

Answer : The organs which cannot be donated during life time are valuable organs, examples are liver, heart, eyes. These organs can be donated after death only.The embryonic stem cells are very valuable because these are special types of cells present in the body of multicellular organisms. These cells give rise to all other types of cells present in the body of multicellular organisms.

Q. 5. D. Answer the following question in your own words.

Explain the importance of fruit processing in human life?

Answer : In our daily meal we are use various products prepared from fruits such as juices, jams and jellies. All these products can be produced by processing on fruits. Fruits are perishable (food items which are easily become rotten) agriculture produce. Fruits are need to be processed in such a way that it can be used throughout the year. Fruit processing includes various methods ranging from storage in cold storage to drying, salting, air tight packing, preparing murabba, evaporating, etc.

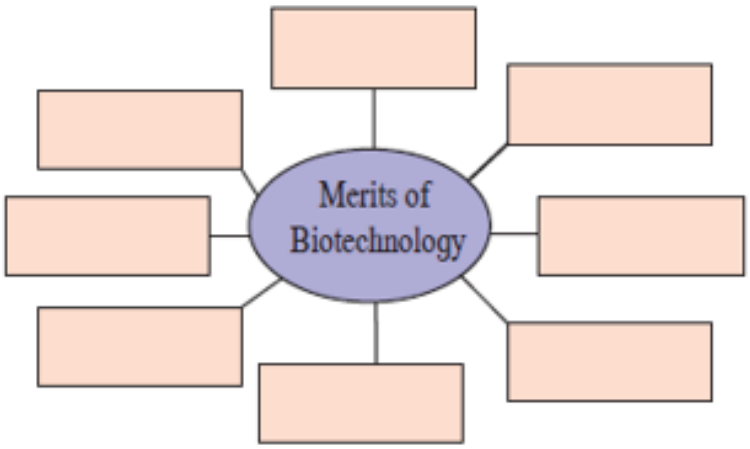
Q. 5. E. Answer the following question in your own words.

Explain the meaning of vaccination.

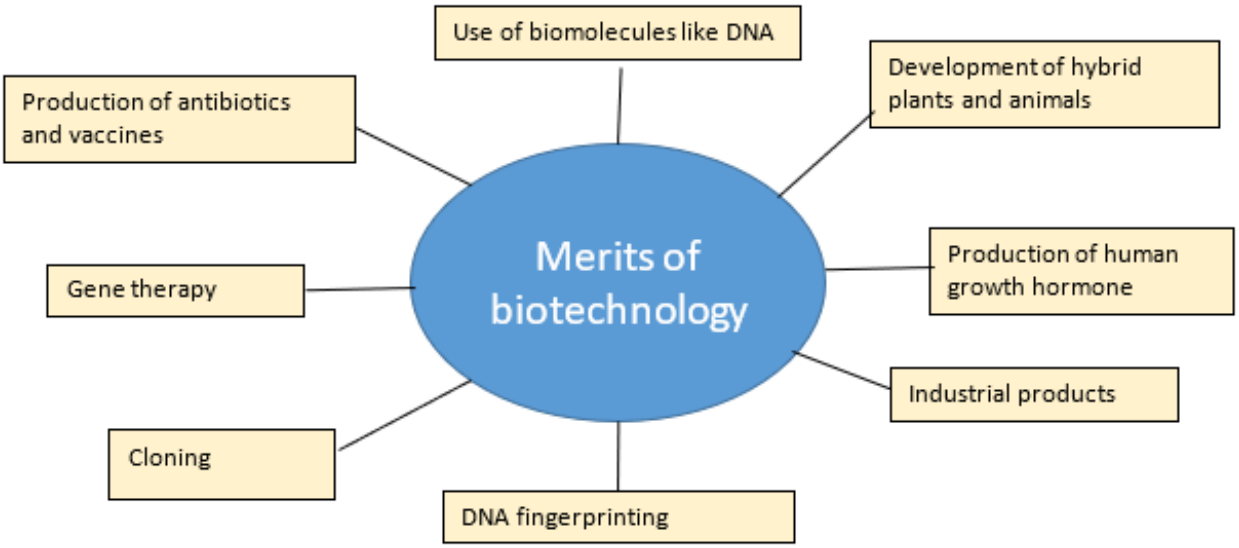
Answer : Vaccination is a process of administering vaccine to the body to acquire either permanent or temporary immunity against a specific pathogen or disease. Traditionally vaccines were prepared with the help of partially killed pathogens against which vaccine is prepared. With this vaccine there were chances of having the disease in case of some persons.

Hence, as an alternative, scientists tried to artificially produce vaccines with the help of biotechnology, safer vaccines are being produced. In this vaccine proteins which act as antigen are injected in pure form instead of injecting the killed or semi-killed pathogens. These proteins keep the persons away from the diseases by keeping the immune system active. Thus, injecting the antigens is safest way in vaccination. Vaccines produced with the help of biotechnology are more thermo-stable and remain active for longer duration. For example Vaccines of polio and hepatitis.

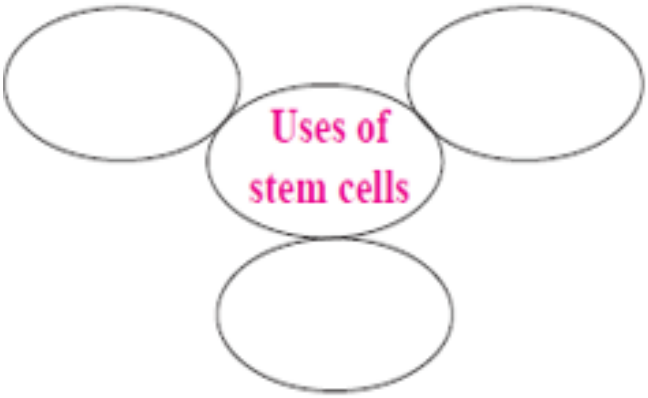
Q. 6. Complete the following chart.



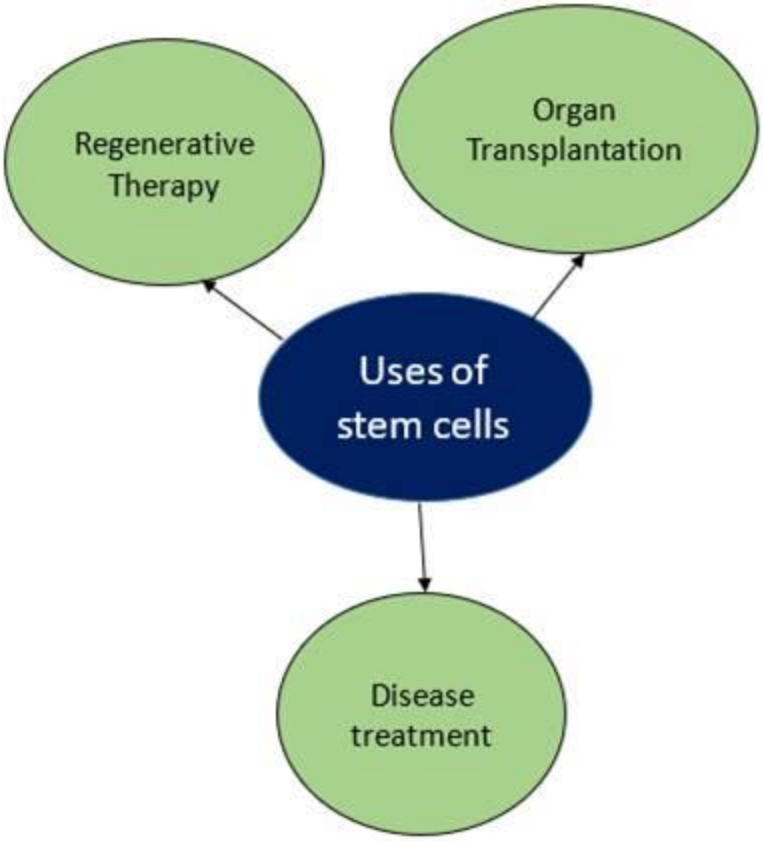
Answer :



Q. 7. Write the correct answer in blank circles.



Answer :



Uses of Stem Cells:

● Regenerative Therapy

Stem cells are used to replace the dead cells in case of conditions like diabetes, myocardial infarction, Alzheimer's disease, Parkinson's disease, etc.

● Organ Transplantation: organs such as kidney and liver can transplanted.

● Disease treatment: stem cells can produce blood cells which is required in conditions like anaemia, thalassemia, leukaemia, etc.

Q. 8. Identify and complete the following correlations.

a. Insulin: Diabetes :: Interleukin : -- -- --
b. Interferon : -- :: Erythropoietin : Anemia.
c. ------- : Dwarfness :: Factor VIII : Hemophilia.
d. White revolution : Dairy:: Blue revolution : -- -- -- --.

Answer : a. Insulin: Diabetes:: Interleukin : **Cancer**

b. Interferon: **Viral infection**:: Erythropoietin : Anemia.

c. Somatostatin: Dwarfness:: Factor VIII : Hemophilia.

d. White revolution: Dairy:: Blue revolution: **Aquatic organisms**.

With the help of biotechnology the following have successfully produced:

Insulin to cure diabetes, interleukin protein for cancer cure, interferon against viral infection, erythropoietin to cure anemia,

Somatostatin growth hormone to overcome dwarfness and Factor VIII to cure hemophilia.

White revolution is to increase milk production and Blue revolution is increase aquatic organisms like fish, shrimp, and lobster production.

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

Answer : Usefulness of Biotechnology:

1. It made possible to increase the per hectare yield irrespective of the limitations of crop-land area.

2. It reduced the expenses on disease control by developing disease resistant varieties.

3. Due to development of fast fruit setting varieties, yield per annum has been increased.

4. Development of stress resistant varieties which can withstand variable temperature, water-stress, changing fertility of soil, etc. has become possible.

Harmfulness of Biotechnology:

1. Genetic engineering is a very vital part of biotechnology and the cost of transferring genes from one species to another is very expensive.

2. When genetic material from certain viruses is used in the production of genetically modified crops, there are chances that these virus genes will combine with crop genes to produce more destructive viruses.

3. Biotechnology also poses a number of environmental threats. Genetically modifies crops often infect monarch butteries and other insect species.