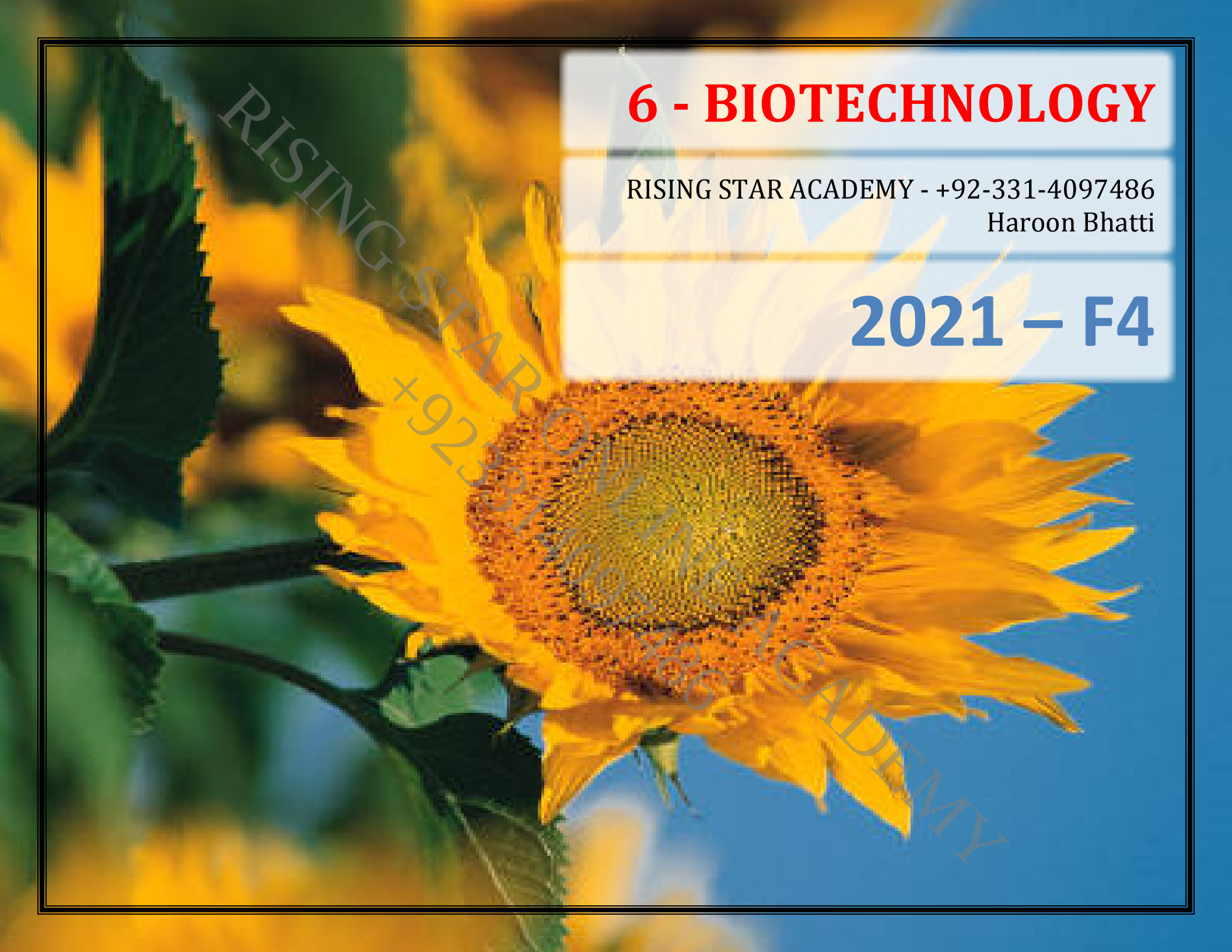


6 - BIOTECHNOLOGY

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Biology Chapter 6

BIOTECHNOLOGY

Question # 1

Choose the correct answer from the following:

1B

2C

3A

4C

5C

6B

7C

8B

9C

10C

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Answer all of the following questions

Question # 1

Define the following terms:

a. biotechnology

It is use of living organism or living entities with technological tool for better production of biomolecule and human services. Example antibiotics production, plant tissue culture, wine production, etc.

b. Plasmid

It is a small circular, extra chromosomal, double stranded DNA molecule present in bacteria which carry gene to help bacteria to survive in adverse condition. Example : col plasmid, R plasmid

c. Genetic engineering

It is manipulation of living organisms characters by altering its genetic material (example Bt cotton ,delayed ripening in tomato, etc.

d. Transformation

DNA transformation is process in which direct uptake and incorporation of exogenous genetic material from its surrounding through cell membrane transfer into the host cell.

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Question # 2

List two types of medical products that can be produced using DNA technology?

Answer:

Two types of medical products that can be generated using DNA technology are as follows:

1. Human growth hormone that is used in treating dwarfism

2. Colony-stimulating factors that are used in treating deficiencies of immune-system by stimulating the production of white blood cells.

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Question # 3

Relate bioethics to the continued development of genetic engineering techniques.

Answer:

The study of ethical issues associated to the DNA technology is termed as bioethics. Many scientists are involved in identification of and addressing any legal, ethical, and social issues that have arisen as the techniques of genetic engineering have developed nearly all scientists agreed to the fact of continued restraint and oversight is needed.

For example, it is of concern to some people that genetically modified (GM) crops may cause harm to the environment in unusual ways.

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Question # 4

Describe two major goals of the Human Genome Project.

Answer:

The HGP (Human Genome Project) is a scientific approach for the determination of the sequence of the chemical base pairs of human DNA.

The two main goals of HGP are:

1. For sequencing and mapping all the DNA base pairs of the chromosomes of humans

2. Identifying all the genes within a sequence

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Question # 5

Distinguish between proteomics and genomics.

Answer:

Genomics is defined as the study of genomes, which is the complete genetic makeup of humans and other organisms. It helps in understanding the sequences of bases in genomes and also the function of genes, introns and as well as intragenic sequences like repetitive DNA (deoxyribonucleic acid) elements, transposons and unique noncoding DNA.

Proteomics is defined as the study of structure, function and interaction of cellular proteins. It helps in identifying and determining the proteins function within a particular cell type. It also helps in the studying of three-dimensional shape of cellular proteins through computer modeling

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Question # 6

Outline the different applications of biotechnology

Answer:

The applications of biotechnology include therapeutics, diagnostics, genetically modified crops for agriculture, processed food, bioremediation, waste treatment, and energy production.

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Question # 7

List some techniques of genetic engineering.

Answer:

Techniques are as follow:

1. Molecular cloning (Recombinant DNA)

2. Gene delivery

3.Genome editing

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Question # 8

Delineate the transgenic organisms and their significance.

Answer:

Transgenic organisms are important research tools, and are often used when exploring a gene's function. Transgenesis is also related to the medical practice of gene therapy, in which DNA is transferred into a patient's cells to treat disease.

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Question # 9

Explain the procedure for the following

a. PCR

Polymerase chain reaction (PCR) is used to amplify a specific DNA sequence by using a pair of oligonucleotide primers. Each pair is complementary to one end of the target DNA sequence. Therefore, PCR is very useful to generate a DNA fragment required for cloning experiment. Diagnosis of specific mutation which are related to genetic diseases.

b. Gel Electrophpresis

Electrophoresis is a method of separation of charged molecules by applying an electric field.

Starch gel electrophoresis is used to separate molecules with the help of starch gel. This gel act as molecular sieve. Starch is partially hydrolysed in buffer to prepare a solution. Then trhe solution is heated and cooled to get starch gel.

c. Gene therapy

Gene therapy is an experimental technique that uses genes to treat or prevent disease. It is designed to introduce genetic material into cells to compensate the abnormal genes or to make a beneficial protein.

Gene therapy is used for the treatment of genetic diseases in humans. Example of genetic diseases are phenylketonuria, haemophgilia A, cystis fibrosis etc

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Question # 10

Describe human genome project and its main goals.

Answer:

The HGP (Human Genome Project) is a scientific approach for the determination of the sequence of the chemical base pairs of human DNA.

The main goals of HGP are:

1. For sequencing and mapping all the DNA base pairs of the chromosomes of humans.

2. Identifying all the genes within a sequence.

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Question # 11

Discuss the drastic environmental impacts of oil spills and how the microbes like bacteria can help mitigate the problem.

Answer:

When oil spills occur in our oceans, they leave behind a wake of ecological devastation. Microbes can play an important role in biodegradation and bioremediation of environmental pollutants, as some can actively degrade these harmful substances, converting them into harmless metabolic byproducts.

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Question # 12

Give an account of significance of transgenic organisms in food industry.

Answer:

A Transgenic organism is that whose genetic material has been altered using genetic engineering techniques. Transgenic organisms possess a novel combination of genetic material to improve the phenotypic traits and features. These modifications produce a new organism which has a new genetic makeup by adding or deleting or replacing genetic material.

The applications of transgenic organism is very beneficial in recent years, like production of production of crops with increased nutrient content and physical appearance like more thick walled (outer sheath) of tomatoes, colorful capsicums, short size of wheat, golden wheat etc.

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Question # 13

Describe the uses of DNA finger printing.

Answer:

These are the possible uses of DNA fingerprinting

(a) Use of DNA fingerprinting in legal disputes, notably to help solve crimes and to determine paternity.

(b) It is also used to identify inherited genetic diseases.

(c) It can be used to identify genetic matches between tissue donors and recipients.

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Question # 14

What is gene cloning?

Answer:

Gene cloning, also known as molecular cloning, refers to the process of isolating a DNA sequence of interest for the purpose of making multiple copies of it. The identical copies are clones

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Question # 15

Elaborately discuss recombinant DNA technology and its usefulness.

Answer:

Recombinant DNA (deoxyribonucleic acid) technology, joining of DNA molecules from two different species and inserting them into a host to produce new genetic combinations that have value medicine, science, agriculture, and human benefits.

Applications of recombinant DNA (deoxyribonucleic acid) technology

1. It is used for mass production of protein based drugs. First drug manufactured using this technology is insulin.

2. Production of transgenic organisms

3. Genetically modified foods are produced using recombinant DNA technology

4. It helps in the process of bioremediation

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