CBSE Test Paper 05

Ch-12 Biotechnology and its Applications

1. Toxicity of drug on human can be studied by using transgenic animal by
   a. Introducing complementary gene into organism
   b. Inoculating gene that make them more sensitive to toxic substances
   c. Introducing gene that show change in physiology of organism
   d. All of the these
2. Assertion: For toxicity testing, transgenic animals are made to carry genes which make them more sensitive to toxic substance.
   Reason: Transgenic animals are exposed to toxic substance to be study to know their effect.
   a. Assertion is correct but reason is incorrect
   b. Both assertion and statements are correct
   c. Both assertion and reason are incorrect
   d. Assertion is incorrect but reason is correct
3. For which of the disease transgenic models do not exists now days?
   a. Cystic fibrosis
   b. Tuberculosis
   c. Cancer
   d. Alzheimer's disease.
4. A person born with hereditary disease can be treated by
   a. Medicine
   b. Thermal therapy
   c. Chemotherapy
   d. Gene therapy
5. AIDS causing virus has
   a. ss RNA
   b. ds DNA
   c. ss DNA
   d. ds RNA
6. Transgenic mice, rabbit, pigs, sheep, cows etc. have been produced but
   a. More than 95% of them are sheep.

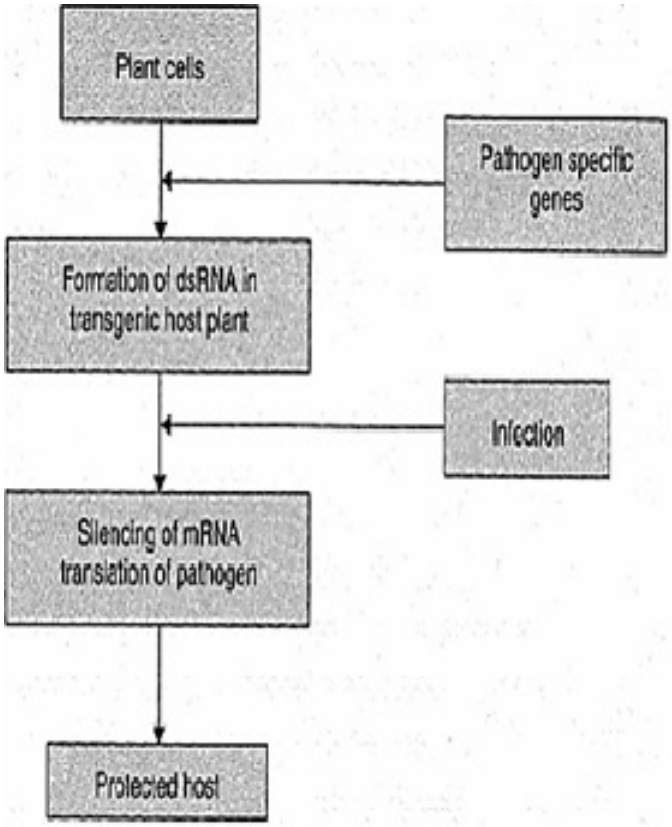
b. More than 95% of them are rabbits.
c. More than 95% of them are cow.
d. More than 95% of them are mice.

7. Using a single template molecule, how many DNA molecules are generated after 10 cycles of amplification in PCR
   a. 1128 molecules
   b. 927 molecules
   c. 1024 molecules
   d. 1224 molecules

8. What is gene therapy? Illustrate using the example of adenosine deaminase (ADA) deficiency.

9. If the genes involved in fruit ripening are selectively mutated, what commercial importance can this serve?

10. Study the given flow chart and answer:



   i. Name the defence mechanism used.
   ii. In which plant it has been done?

iii. Name the pathogen.
iv. Name the vector used in this technique.

11. Mention the cause and the body system affected by ADA deficiency in humans.

12. Which three options could be thought for increasing food production?

13. Sangeeta has developed a transgenic crop. She wants to grow this crop directly into the field. Will you allow her to do so? What will you suggest her?

14. What are Cry proteins? Name an organism that produce it. How has man exploited this protein to his benefit?

15. Sunil's uncle is very worried as his crop is destroyed by insects. He suggests his uncle to use Bt crops. His uncle says that such crops produce toxins which can harm the consumers of this crop. Whom do you support and why?

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Answer

1. b. Inoculating gene that make them more sensitive to toxic substances,
Explanation: Chemical safety testing: This is known as toxicity/safety testing. The procedure is the same as that used for testing toxicity of drugs. Transgenic animals are made that carry genes which make them more sensitive to toxic substances than non-transgenic animals. They are then exposed to the toxic substances and the effects studied. Toxicity testing in such animals will allow us to obtain results in less time.
2. b. Both assertion and statements are correct, **Explanation:** Transgenic animals are used to study the toxicity effects of certain chemical in which animals are made to carry gene which make them more sensitive to toxic substance and exposed to toxic substance to be studied.
3. b. Tuberculosis, **Explanation:** Transgenic model for treatment of disease is available today for cancer, cystic fibrosis, Alzheimer's disease and rheumatoid arthritis disease.
4. d. Gene therapy, **Explanation:** Hereditary diseases are due to defects in gene. Gene can be corrected at embryonic stage by gene therapy technique in which genes are inserted into person cells or tissue to take over the function of defective gene.
5. a. ss RNA, **Explanation:** Acquired immunodeficiency syndrome is caused by human immuno virus. This virus has single stranded RNA as genetic material in place of DNA.
6. d. More than 95% of them are mice, **Explanation:** The majority of transgenic animals produced so far are mice, the animal that pioneered the technology. The first successful transgenic animal was a mouse. A few years later, it was followed by rabbits, pigs, sheep, and cattle.
Transgenic mice, rabbit, pigs, sheep, cows etc. have been produced but more than 95% of them are mice.
7. c. 1024 molecules, **Explanation:** Each cycle doubles the number of DNA

molecules. Using automated equipment, each cycle of replication can be completed in less than 5 minutes. After 10 cycles, what began as a single molecule of DNA has been amplified into

8. **Gene Therapy.** It is a collection of methods that allows correction of a gene defect that has been diagnosed in a child or embryo. In gene therapy, normal genes are inserted into a person's cells and tissues to treat a hereditary defect. Gene therapy is being tried for sickle cell anemia and severe combined Immuno-Deficiency (SCID).

   In some children ADA deficiency can be cured by bone marrow transplantation. In others, it can be treated by enzyme replacement therapy, in which functional ADA is given to the patient by injection. But both of these approaches are not completely curative. However, in gene therapy, lymphocytes from the blood of the patient are grown in a culture outside the body. A functional ADA cDNA (using a retroviral vector) is then introduced into these lymphocytes, which are subsequently returned to the patient. Since these cells are not immortal, the patient requires periodic infusion of such genetically engineered lymphocytes. However, if the gene isolated from marrow cells producing ADA is introduced into cell at early embryonic stages, the disease could be cured permanently.

9. - Fruits do not ripen thereby preventing rotting during transportation.
   - Before sale ethylene gas can be used to ripen.

10. i. RNA interference (RNAi)
    ii. Tobacco plant
    iii. Meloidegyne imcognitia (nematode)
    iv. Agrobacterium tumefacines vector.

11. Adenosine deaminase deficiency is caused by changes (mutations) in the ADA gene . This gene encodes an enzyme that is found in the lymphocytes (specialized white blood cells), which are an important part of the immune system and help protect the body from infections.

    It affects the immune system of our body

12. The three options that can be thought for increasing food production are,

- Agro-chemical based agriculture
- Organic agriculture; and
- Genetically engineered crop-based agriculture.

The Green Revolution has succeeded in tripling the food supply but yet it was not enough to feed the growing human population. Scientists have decided that use of genetically modified crops is a possible solution. Plants, bacteria, fungi and animals whose genes have been altered by manipulation are called Genetically Modified Organisms (GMO).

13. No, as GMO may pose some threat to environment or living organism. I will ask her to approach GEAC as GEAC is responsible for approval of proposals relating to release of genetically engineered organisms and products into the environment including experimental field trials.
    Values
    • Sense of responsibility.
    • Understanding.

14. - Cry proteins refer to the protein crystals containing a toxic insecticide.
    - It is produced by a soil bacterium, Bacillus thuringiensis
    - The genes encoding cry proteins called Bt toxin genes were isolated from B. thuringiensis and incorporated into several crop plants such as Bt cotton, Bt corn etc. to provide resistance against insect pests.

15. I support him.
    Bt crops produce protoxin which changes into active form only in the intestine of insects in alkaline pH. It is completely safe for other animals and human beings.
    Values
    • Empathy.
    • Awareness.