CBSE Test Paper 04

Ch-11 Biotechnology Principles and Processes

1. Agrobacterium tumifaciens is called as the natural genetic engineer as
   a. It causes crown gall
   b. It can be disarmed
   c. Gene transfer occurs without any human effort
   d. It is a plant pathogen
2. The DNA fragments in an agarose gel at the same position signify that the two fragments have
   a. Same molecular weight
   b. The gel is not properly made
   c. Different molecular weights
   d. EtBr is hindering the travel of the fragments
3. Restriction endonucleases are used in genetic engineering to form
   a. DNA Designing
   b. Amplification of DNA fragment
   c. Recombinant molecules of DNA
   d. Joining two DNA segments
4. The goi is able to multiply in the bacterial cell because of
   a. Antibiotic resistant gene
   b. Ori in the plasmid
   c. Prokaryotic bacterial cell
   d. The short length of the chromosome
5. Molecular scissors is the name given to
   a. Polymerase
   b. Restriction enzymes
   c. Ligase
   d. Phosphatase
6. Agarose gel is used for electrophoresis because
   a. It is inert
   b. It is a polysaccharide
   c. It is cheap

d. It is easily extractable

7. Rop genes in pBR322 codes for
   a. Ampicillin resistance
   b. Antibiotic resistance
   c. Tetracycline resistance
   d. Proteins involved in replication of plasmid

8. What type of cuts ends are formed when both the strands of DNA is cleaved at exactly the same nucleotide position?

9. What are selectable markers? Give examples.

10. Give an example of micro organisms that have transforming ability.

11. What is vector? Which cloning vector was discovered first?

12. What is recombinant DNA? For creating recombinant vector molecule, can two different restriction enzymes be used for cutting vector and source DNA?

13. A newspaper has reported that an American company has patented turmeric. Indian government is fighting against this patent. What will you call this act of American company?

14. Write the full form of PCR. What are the three basic steps involved in a single PCR amplification cycle?

15. Describe briefly the following: Origin of replication.

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Answer

1. c. Gene transfer occurs without any human effort, **Explanation:** A. tumifaciens has exceptional ability to transfer a particular DNA segment to the tumer inducing plasmid into the nucleus of infected cells.
   Agrobacterium tumifaciens is called as the natural genetic engineer as in this bacterium brings about gene transfer to plants without involvement of human.
2. a. Same molecular weight, **Explanation:** Gel electrophoresis is a technique used to separate DNA fragments (or other macromolecules, such as RNA and proteins) based on their size and charge. Electrophoresis involves running a current through a gel containing the molecules of interest. Based on their size and charge, the molecules will travel through the gel in different directions or at different speeds, allowing them to be separated from one another.
   The DNA fragments in an agarose gel at the same position signify that the two fragments have same molecular weight and travel same distance.
3. c. Recombinant molecules of DNA, **Explanation:** Restriction enzymes, or restriction endonucleases, are enzymes specialized in the cutting of DNA fragments, which each have an effect on specific sites of the DNA molecule. Restriction enzymes are used in recombinant DNA technology to obtain with pieces of DNA molecules with precision, which will later be inserted into other DNA molecules cut by the same enzymes.
4. b. Ori in the plasmid, **Explanation:** The goi (gene of interest) is able to multiply in bacterial cell because of Ori (Origin of replication)in the plasmid of bacterial cell. Ori is a particular sequence in a genome at which replication is initiated.
5. b. Restriction enzymes, **Explanation:** Restriction enzymes are called molecular scissors as they are used to cut the DNA segments at specific points. There are two kinds of restriction enzymes exonucleases and endonucleases enzymes.
6. a. It is inert, **Explanation:** The most common gel used for electrophoresis is agarose gel. Agarose gel is inert hence do not react with DNA or Protein.

Agarose is a natural polymer obtained from sea weeds.

7. d. Proteins involved in replication of plasmid, **Explanation:** The plasmid pBR322 contains a Rop gene coding for the Rop protein, which promotes conversion of the unstable RNA I – RNA II complex to a stable complex.
   Rop genes in pBR322 codes for protein involved in replication of plasmid.
   Plasmid are able to take the foreign gene and to be transferred to target cells.

8. Blunt or flush ends

9. Selectable markers are the genes which help in identifying and eliminating non-transformants and will permit the growth of transformants only.
   Example: Gene coding for reesistance to ampicillin (amp*) gene coding for resistance to tetracycline (tet*) antibiotic.

10. A bacterium Agrobacterium tumefaciens has T-DNA in its Ti-plasmid which is able to transform normal plant cells to tumour cell and cause crown gall tumours in plants. In animals retroviruses have this ability.

11. vector is a DNA molecule used as a vehicle to artificially carry foreign genetic material into another cell, where it can be replicated and/or expressed(e.g.- plasmid, cosmic,Lambda phages). A vector containing foreign DNA is termed recombinant DNA.

    pBR322 is a plasmid and was one of the first widely used E. coli cloning vectors. Created in 1977 in the laboratory of Herbert Boyer at the University of California, San Francisco, it was named after the postdoctoral researchers who constructed it. The p stands for "plasmid," and BR for "Bolivar" and "Rodriguez.

12. When a specific gene sequence is linked with plasmid vector with the help of DNA ligase, a new combination of circular autonomously replicating DNA is formed and it is called recombinant DNA.

    No, recombinant vector can be created only if the same restriction enzyme cuts both the vector DNA and the source DNA, as their palindromic sequences should be same.

13. Biopiracy.

Values

• Awareness

• Justice for country.

14. The polymerase chain reaction (PCR) was originally developed in 1983 by the American biochemist Kary Mullis. He was awarded the Nobel Prize in Chemistry in 1993 for his pioneering work.

    PCR involves a process of heating and cooling called thermal cycling which is carried out by machine.

    There are three main stages:

    - **Denaturation** – when the double-stranded template DNA is heated to separate it into two single strands.
    - **Annealing** – when the temperature is lowered to enable the DNA primers to attach to the template DNA.
    - **Extension** – when the temperature is raised and the new strand of DNA is made by the Taq polymerase enzyme.

15. **Origin of replication:** This is a sequence from where replication starts and any piece of DNA when linked to this sequence can be made to replicate within the host cells. This sequence is also responsible for controlling the copy number of the linked DNA. So, if one wants to recover many copies of the target DNA it should be cloned in a vector whose origin support high copy number.