CBSE NCERT Based Chapter wise Questions (2025-2026)

Class-XII

Subject: Biology

Chapter Name : Biotechnology: Principles and Processes (Chap : 9)

Total : 6 Marks (expected) [MCQ(2)-2 Marks, CBQ(1)-4 Marks]

Level - 1

MCQ Type :

1. The enzyme used to cut DNA at specific sites is called
   Ⓐ Ligase Ⓑ Restriction endonuclease
   Ⓒ Polymerase Ⓓ Transcriptase
2. Plasmids are commonly used as
   Ⓐ Enzymes Ⓑ Vectors Ⓒ Hormones Ⓓ Antibodies
3. The bacterium widely used in genetic engineering is
   Ⓐ *Bacillus subtilis* Ⓑ *Salmonella* Ⓒ *Escherichia coli* Ⓓ *Streptococcus*
4. Which enzyme joins DNA fragments?
   Ⓐ Restriction enzyme Ⓑ DNA ligase Ⓒ RNA polymerase Ⓓ Helicase
5. The process of transferring recombinant DNA into host cell is called
   Ⓐ Translation Ⓑ Transcription Ⓒ Transformation Ⓓ Transduction
6. Which vector has an origin of replication?
   Ⓐ Antibiotic Ⓑ Plasmid Ⓒ Ligase Ⓓ Hormone
7. PCR stands for
   Ⓐ Polymerase Chain Reaction Ⓑ Protein Chain Reaction
   Ⓒ Polymerase Cloning Reaction Ⓓ Protein Cloning Reaction
8. Taq polymerase is obtained from
   Ⓐ Virus Ⓑ Fungi Ⓒ Thermophilic bacteria Ⓓ Yeast
9. Which is used to separate DNA fragments?
   Ⓐ Centrifugation Ⓑ Gel electrophoresis Ⓒ PCR Ⓓ Cloning
10. The selectable marker commonly used in plasmids is
    Ⓐ Insulin gene Ⓑ Antibiotic resistance gene
    Ⓒ rRNA gene Ⓓ tRNA gene

Assertion and Reason :

Directions: Read the following questions and choose any one of the following four responses.

A: Assertion and Reason both are correct and Reason is the correct explanation of Assertion.

B: Assertion and Reason both are correct and Reason is not the correct explanation of Assertion.

C: Assertion is correct but Reason is wrong.

D: Assertion is wrong but Reason is correct.

1. **Assertion (A) :** Restriction enzymes are called molecular scissors.
   Reason (R) : They cut DNA at specific recognition sites.
   Ⓐ A Ⓑ B Ⓒ C Ⓓ D

2. **Assertion (A) :** Plasmids are used as vectors.
Reason (R) : Plasmids can replicate independently inside host cells.
Ⓐ A Ⓑ B Ⓒ C Ⓓ D

3. **Assertion (A) :** DNA ligase is required in recombinant DNA technology.
Reason (R) : It cuts DNA at specific sites.
Ⓐ A Ⓑ B Ⓒ C Ⓓ D

4. **Assertion (A) :** PCR helps in amplification of DNA.
Reason (R) : It requires DNA polymerase enzyme.
Ⓐ A Ⓑ B Ⓒ C Ⓓ D

5. **Assertion (A) :** Taq polymerase is heat stable.
Reason (R) : It is isolated from thermophilic bacteria.
Ⓐ A Ⓑ B Ⓒ C Ⓓ D

6. **Assertion (A) :** Antibiotic resistance genes act as selectable markers.
Reason (R) : They help identify transformed cells.
Ⓐ A Ⓑ B Ⓒ C Ⓓ D

7. **Assertion (A) :** Gel electrophoresis separates DNA fragments.
Reason (R) : DNA moves towards positive electrode due to negative charge.
Ⓐ A Ⓑ B Ⓒ C Ⓓ D

8. **Assertion (A) :** Vectors lack origin of replication.
Reason (R) : Origin of replication is essential for DNA replication.
Ⓐ A Ⓑ B Ⓒ C Ⓓ D

9. **Assertion (A) :** Host cells are not required in biotechnology.
Reason (R) : Recombinant DNA replicates only inside host cells.
Ⓐ A Ⓑ B Ⓒ C Ⓓ D

10. **Assertion (A) :** PCR occurs inside living cells.
Reason (R) : PCR is an in vitro technique.
Ⓐ A Ⓑ B Ⓒ C Ⓓ D

Very Short Answer Questions :

1. What is recombinant DNA?
2. Name any one cloning vector.
3. What is the role of restriction enzymes?
4. Define PCR.
5. Name the enzyme used in PCR.
6. What is transformation?
7. What is a selectable marker?
8. Name the host commonly used in biotechnology.
9. Which molecule carries genetic information?
10. What is agarose gel used for?

Short Answer Questions :

1. What is the function of plasmid in genetic engineering?
2. Write three characteristics of a good vector.
3. What is gene cloning?
4. Explain the role of DNA ligase.
5. Why is *E. coli* commonly used as host?

Long Answer Questions :

1. Explain the steps involved in recombinant DNA technology.
2. Describe the process of PCR.
3. What are vectors? Explain their features.
4. Explain gel electrophoresis.
5. Describe the role of enzymes used in genetic engineering.

Case Based Questions.

1. Read the given passage and answer the following questions:

A scientist wants to produce multiple copies of a gene using PCR. It is a widely used technique in biotechnology to amplify a specific segment of DNA in vitro, It allows production of copies of a desired DNA sequence starting from a very small amount of DNA.

Answer the following:

(a) Name the full form of the technique used.
(b) Which enzyme is required?
(c) Name the three steps of this technique.
(d) Why is heat-stable enzyme needed?

2. Read the given passage and answer the following questions:

A plasmid containing an antibiotic resistance gene is used in cloning. These genes are introduced into cloning vectors along with the foreign DNA. These antibiotic resistance genes make the process of cloning easier and more efficient by allowing the selection of desired recombinant cells.

Answer the following:

(a) Why is antibiotic resistance gene used?
(b) What is the plasmid called?
(c) Name the host cell.
(d) What is transformation?

ANSWER

MCQs

1. Ⓑ	3. Ⓒ	5. Ⓒ	7. Ⓐ	9. Ⓑ
2. Ⓑ	4. Ⓑ	6. Ⓑ	8. Ⓒ	10. Ⓑ

Assertion-Reason

1. Ⓐ	3. Ⓒ	5. Ⓐ	7. Ⓐ	9. Ⓓ
2. Ⓐ	4. Ⓐ	6. Ⓐ	8. Ⓓ	10. Ⓓ