

Biotechnology: Principles and Processes — Assignment 1

Class 12 Biology · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.
(2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.
(3) Universal values: $g = 10 \text{ m/s}^2$ unless stated. Give answers with correct SI units.

Principles of Biotechnology

MCQ Questions (choose the correct option)

- The two core techniques of modern biotechnology are
 - genetic engineering and sterile culture
 - microscopy and staining
 - centrifugation and filtration
 - titration and distillation
- Genetic engineering involves
 - altering genetic material
 - staining cells
 - growing plants
 - chemical analysis
- A sterile environment is needed for
 - growing desired microbes only
 - killing all cells
 - colour change
 - pH control
- Biotechnology is the use of
 - living organisms for products
 - only chemicals
 - only machines
 - only metals

1 Mark Questions

- Name the two core techniques of modern biotechnology.
- What is genetic engineering?

2 Mark Questions

- Why is a sterile environment needed in biotechnology?
- What is modern biotechnology?

3 Mark Questions

- Describe the principles of biotechnology.
- Differentiate between traditional and modern biotechnology.

Tools of Recombinant DNA Technology

MCQ Questions (choose the correct option)

1. Restriction enzymes are also called
 - (A) molecular scissors
 - (B) molecular glue
 - (C) vectors
 - (D) hosts
2. Restriction enzymes cut DNA at
 - (A) palindromic sequences
 - (B) random sites
 - (C) only ends
 - (D) only one site
3. The enzyme that joins DNA fragments is
 - (A) ligase
 - (B) polymerase
 - (C) primase
 - (D) helicase
4. The enzyme used to amplify DNA is
 - (A) Taq polymerase
 - (B) ligase
 - (C) primase
 - (D) helicase

1 Mark Questions

1. Name the enzyme used to cut DNA.
2. Name the enzyme used to join DNA fragments.
3. What is a palindromic sequence?

2 Mark Questions

1. What are restriction endonucleases?
2. Name two tools of recombinant DNA technology.

3 Mark Questions

1. Describe the tools of recombinant DNA technology.
2. Explain the role of restriction enzymes and ligase.

Cloning Vectors and Competent Host Cells

MCQ Questions (choose the correct option)

1. ori in a vector controls the
 - (A) copy number
 - (B) colour
 - (C) size
 - (D) shape
2. A selectable marker is used to
 - (A) identify recombinants

- (B) cut DNA
 - (C) join DNA
 - (D) amplify DNA
3. Competent cells are prepared using
- (A) calcium chloride
 - (B) sodium chloride
 - (C) ethanol
 - (D) acetic acid
4. A common cloning vector is
- (A) pBR322
 - (B) plasmid only
 - (C) virus only
 - (D) chromosome

1 Mark Questions

1. What is a cloning vector?
2. What is a selectable marker?
3. What is ori?

2 Mark Questions

1. Name the features that make a good vector.
2. How is a competent host cell prepared?

3 Mark Questions

1. Describe the features of a good cloning vector.
2. Explain how competent host cells are prepared.

The Process — From DNA Isolation to Transformation

MCQ Questions (choose the correct option)

1. The first step of rDNA technology is
 - (A) DNA isolation
 - (B) transformation
 - (C) selection
 - (D) downstream processing
2. DNA can be cut and joined using
 - (A) restriction enzymes and ligase
 - (B) only ligase
 - (C) only polymerase
 - (D) stains
3. Transformation is the uptake of
 - (A) foreign DNA
 - (B) protein
 - (C) lipid
 - (D) carbohydrate

4. DNA fragments are separated by
- (A) gel electrophoresis
 - (B) centrifugation
 - (C) filtration
 - (D) distillation

1 Mark Questions

1. What is transformation?
2. Name the technique used to separate DNA fragments.
3. What is the first step of rDNA technology?

2 Mark Questions

1. Why is DNA fragmented before ligation?
2. How is foreign DNA introduced into a host?

3 Mark Questions

1. Describe the steps of recombinant DNA technology.
2. Explain DNA isolation, cutting and ligation.

Selection of Recombinantants

MCQ Questions (choose the correct option)

1. Recombinant cells are selected using
 - (A) selectable markers
 - (B) colour only
 - (C) size only
 - (D) shape only
2. Insertional inactivation is the loss of a
 - (A) marker gene function
 - (B) vector
 - (C) host
 - (D) enzyme
3. Antibiotic resistance is a common
 - (A) selectable marker
 - (B) vector
 - (C) host
 - (D) enzyme
4. Replica plating helps identify
 - (A) recombinants
 - (B) nutrients
 - (C) proteins
 - (D) lipids

1 Mark Questions

1. What is a selectable marker?

2. What is insertional inactivation?
3. Name one selectable marker.

2 Mark Questions

1. How are recombinant cells selected?
2. Explain insertional inactivation.

3 Mark Questions

1. Describe the selection of recombinant cells.
2. Explain the use of antibiotic resistance in selection.

Bioreactors and Downstream Processing

MCQ Questions (choose the correct option)

1. The most common bioreactor is the
 - (A) stirred-tank bioreactor
 - (B) spinner flask
 - (C) airlift reactor
 - (D) packed bed
2. A stirrer in a bioreactor ensures
 - (A) even mixing and aeration
 - (B) colour change
 - (C) sterility
 - (D) pH control
3. Downstream processing is the
 - (A) separation and purification of product
 - (B) cutting of DNA
 - (C) joining of DNA
 - (D) amplification of DNA
4. The product is obtained after
 - (A) downstream processing
 - (B) transformation
 - (C) selection
 - (D) isolation

1 Mark Questions

1. What is a bioreactor?
2. What is downstream processing?
3. Why is a stirrer used in a bioreactor?

2 Mark Questions

1. Describe the components of a bioreactor.
2. Why is downstream processing important?

3 Mark Questions

1. Describe the components and working of a stirred-tank bioreactor.

2. Explain downstream processing.