

Biotechnology: Principles and Processes — CBSE Pattern Test 2

Class 12 Biology · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 2 — CBSE Pattern (90 minutes, 40 marks)

Class 12 Biology · Biotechnology: Principles and Processes · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.

(2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.

(3) For MCQ questions choose the single correct option; for VSA answers write a single line.

(4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

1. The enzyme used to amplify DNA is
 - (A) Taq polymerase
 - (B) ligase
 - (C) primase
 - (D) helicase
2. A selectable marker is used to
 - (A) identify recombinants
 - (B) cut DNA
 - (C) join DNA
 - (D) amplify DNA
3. DNA fragments are separated by
 - (A) gel electrophoresis
 - (B) centrifugation
 - (C) filtration
 - (D) distillation
4. A stirrer in a bioreactor ensures
 - (A) even mixing and aeration
 - (B) colour change
 - (C) sterility
 - (D) pH control
5. The first step of rDNA technology is
 - (A) DNA isolation
 - (B) transformation
 - (C) selection
 - (D) downstream processing
6. A common cloning vector is
 - (A) pBR322
 - (B) plasmid only
 - (C) virus only
 - (D) chromosome
7. ori in a vector controls the
 - (A) copy number

- (B) colour
 - (C) size
 - (D) shape
8. The product is obtained after
- (A) downstream processing
 - (B) transformation
 - (C) selection
 - (D) isolation
9. Name the enzyme used to cut DNA.
10. What is a selectable marker?

Section B — Short Answer I ($4 \times 2 = 8$ marks)

11. Name the enzyme used to amplify DNA.
12. What is a bioreactor?
13. What is transformation?
14. What is insertional inactivation?

Section C — Short Answer II ($4 \times 3 = 12$ marks)

15. Describe the steps of recombinant DNA technology.
16. Explain insertional inactivation.
17. Describe the features of a good cloning vector.
18. Explain the use of antibiotic resistance in selection.

Section D — Long Answers ($2 \times 5 = 10$ marks)

19. (a) Describe the tools of recombinant DNA technology. (b) Describe the selection of recombinant cells.
20. (a) Describe the process of recombinant DNA technology. (b) Describe the components and working of a stirred-tank bioreactor.

Answer Key (Marking Scheme)

- Q1 — (A) Taq polymerase. Q2 — (A) identify recombinants. Q3 — (A) gel electrophoresis. Q4 — (A) even mixing and aeration. Q5 — (A) DNA isolation. Q6 — (A) pBR322. Q7 — (A) copy number. Q8 — (A) downstream processing.
- Q9 — Restriction enzyme (restriction endonuclease).
- Q10 — A selectable marker aids identification of recombinants (e.g. antibiotic resistance).
- Q11 — Taq polymerase.
- Q12 — A bioreactor is a vessel for large-scale culture.
- Q13 — Transformation is the uptake of foreign DNA by a host cell.
- Q14 — Insertional inactivation is the loss of a marker gene's function when foreign DNA is inserted.
- Q15 — Isolation → cutting → ligation → transformation → selection → downstream processing.
- Q16 — Inserting foreign DNA into a marker gene disrupts it, so the cell loses that function.
- Q17 — ori, selectable marker, cloning sites and small size.

Q18 — Cells with the resistance plasmid survive on antibiotic medium; recombinants are distinguished by insertional inactivation.

Q19 — (a) Restriction enzymes, ligase, polymerase, vectors and hosts. (b) Using selectable markers and insertional inactivation.

Q20 — (a) Isolation → cutting → ligation → transformation → selection → downstream processing. (b) Vessel with agitator, aerator and temperature/pH control.