

Biotechnology and Its Applications — 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 and Its Applications · 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. Bt toxin becomes active in the
 - (A) alkaline gut
 - (B) acidic stomach
 - (C) blood
 - (D) soil
2. RNA interference blocks
 - (A) translation of a target mRNA
 - (B) DNA replication
 - (C) transcription only
 - (D) protein folding
3. Human insulin is produced in
 - (A) E. coli
 - (B) yeast only
 - (C) plant cells
 - (D) animal cells only
4. ADA deficiency is caused by the absence of
 - (A) adenosine deaminase
 - (B) insulin
 - (C) haemoglobin
 - (D) collagen
5. ELISA detects
 - (A) antigens or antibodies
 - (B) DNA only
 - (C) RNA only
 - (D) lipids
6. Golden rice is enriched with
 - (A) beta-carotene
 - (B) iron
 - (C) protein
 - (D) calcium
7. RNAi was used to develop resistance against
 - (A) nematodes

- (B) bacteria
 - (C) fungi
 - (D) viruses
8. Ethical issues of genetic engineering include
- (A) patenting of life forms
 - (B) crop yield
 - (C) soil health
 - (D) water use
9. Name the enzyme whose absence causes ADA deficiency.
10. What is a transgenic animal?

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

11. Where does Bt toxin become active?
12. What is the role of a vector in gene therapy?
13. Name one example of a GM crop.
14. What is bioethics?

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

15. Describe RNAi-mediated pest resistance.
16. Explain the use of transgenic animals.
17. Describe the scope of biotechnology applications.
18. Explain the production of human insulin by genetic engineering.

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

19. (a) Describe the agricultural applications of biotechnology. (b) Describe the medical applications of biotechnology.
20. (a) Describe the techniques of molecular diagnosis. (b) Discuss the ethical issues raised by genetic engineering and biopiracy.

Answer Key (Marking Scheme)

- Q1 — (A) alkaline gut. Q2 — (A) translation of a target mRNA. Q3 — (A) E. coli. Q4 — (A) adenosine deaminase. Q5 — (A) antigens or antibodies. Q6 — (A) beta-carotene. Q7 — (A) nematodes. Q8 — (A) patenting of life forms.
- Q9 — Adenosine deaminase.
- Q10 — A transgenic animal carries a foreign gene (e.g. transgenic mice).
- Q11 — In the alkaline gut of the insect.
- Q12 — The vector delivers the normal gene into the patient's cells.
- Q13 — Bt cotton (or golden rice).
- Q14 — Bioethics is the ethical use of biotechnology.
- Q15 — dsRNA silences the target mRNA, blocking translation and killing the pest.
- Q16 — Transgenic animals are used to study disease and produce biological products.
- Q17 — Agriculture (GM crops), medicine (insulin, vaccines), diagnostics and pest control.
- Q18 — The human insulin gene is inserted into E. coli, which then produces insulin.

Q19 — (a) GM crops, Bt crops, RNAi. (b) Recombinant insulin, gene therapy, diagnostics.

Q20 — (a) PCR and ELISA. (b) Patenting life forms, biosafety, biopiracy.