

Biotechnology and Its Applications — CBSE Pattern Test 1

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

Test 1 — 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 cotton is made using
 - (A) *Bacillus thuringiensis*
 - (B) *E. coli*
 - (C) *Agrobacterium*
 - (D) *Rhizobium*
2. The first GM food crop approved for human consumption was
 - (A) golden rice
 - (B) Bt cotton
 - (C) Bt brinjal
 - (D) tomato
3. Gene therapy is used to treat
 - (A) ADA deficiency
 - (B) malaria
 - (C) typhoid
 - (D) ringworm
4. PCR is used for
 - (A) DNA amplification
 - (B) protein synthesis
 - (C) staining
 - (D) centrifugation
5. Biopiracy is the unauthorised use of
 - (A) biological resources
 - (B) machines
 - (C) metals
 - (D) fossil fuels
6. Bt toxin is a
 - (A) protoxin
 - (B) antibiotic
 - (C) hormone
 - (D) enzyme
7. The nematode that infects tobacco plants is
 - (A) *Meloidogyne incognita*

- (B) Ascaris
 - (C) Wuchereria
 - (D) Plasmodium
8. Recombinant insulin is used to treat
- (A) diabetes
 - (B) malaria
 - (C) typhoid
 - (D) cancer only
9. What is RNA interference?
10. What is molecular diagnosis?

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

11. Name the bacterium used to make Bt cotton.
12. What is gene therapy?
13. What is golden rice?
14. What is biopiracy?

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

15. Describe the production of Bt cotton and its action.
16. Describe the production of human insulin by genetic engineering.
17. Explain gene therapy with an example.
18. Describe the techniques of molecular diagnosis.

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

19. (a) Describe the agricultural applications of biotechnology. (b) Describe RNAi-mediated pest resistance.
20. (a) Describe the medical applications of biotechnology. (b) Discuss the ethical issues raised by genetic engineering.

Answer Key (Marking Scheme)

- Q1 — (A) *Bacillus thuringiensis*. Q2 — (A) golden rice. Q3 — (A) ADA deficiency. Q4 — (A) DNA amplification. Q5 — (A) biological resources. Q6 — (A) protoxin. Q7 — (A) *Meloidogyne incognita*. Q8 — (A) diabetes.
- Q9 — RNAi silences a specific mRNA, blocking translation.
- Q10 — Molecular diagnosis detects a disease at the DNA/RNA or protein level.
- Q11 — *Bacillus thuringiensis*.
- Q12 — Gene therapy corrects a genetic defect by introducing a normal gene.
- Q13 — Golden rice is a GM crop enriched with beta-carotene.
- Q14 — Biopiracy is the unauthorised use of biological resources or traditional knowledge.
- Q15 — Bt gene → protoxin → active toxin in alkaline gut → pores → insect death.
- Q16 — The insulin gene is inserted into *E. coli*, which produces insulin.
- Q17 — A normal gene is introduced by a vector; e.g. ADA deficiency.
- Q18 — PCR (DNA amplification) and ELISA (antigen/antibody detection).
- Q19 — (a) GM crops, Bt crops, RNAi. (b) dsRNA silences the nematode's mRNA.

Q20 — (a) Recombinant insulin, gene therapy, diagnostics. (b) Patenting life forms, biosafety, biopiracy.