Biology | NEET

Class 12 Biology - Biotechnology: Principles and Processes

NEET track | Short Notes + 5 CBSE-based questions + 5 NEET PYQ-based questions with solutions

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Format: Quick revision + solved practice	Chapter scope: Class 12 Biology

1. Quick Short Notes

- Biotechnology uses living organisms, cells or biomolecules to develop useful products and processes.
- Genetic engineering involves cutting, joining and transferring DNA to obtain recombinant DNA.
- Important tools of recombinant DNA technology include restriction enzymes, DNA ligase, polymerases, vectors and competent host cells.
- Restriction endonucleases recognise specific palindromic DNA sequences and cut DNA at or near those sites.
- A cloning vector should have origin of replication, selectable marker and suitable restriction sites.
- PCR amplifies DNA through repeated cycles of denaturation, annealing and extension.
- Taq polymerase is used in PCR because it remains stable at high temperature.
- Gel electrophoresis separates DNA fragments according to size; smaller fragments move faster.
- Bioreactors are large vessels used for growing cells/microbes on industrial scale. Downstream processing is done after biosynthesis.
- Board tip: in PCR answers, always write the three steps in correct sequence.

2. CBSE-based Board Practice

Q1. Name the major tools of recombinant DNA technology.

Solution: Major tools are restriction enzymes, DNA ligase, polymerases, cloning vectors and competent host cells.

Q2. State any three essential features of a good cloning vector.

Solution: A good cloning vector should have an origin of replication, selectable marker, and unique restriction sites for insertion of foreign DNA.

Q3. Write the three steps of PCR.

Solution: The three steps are: denaturation of double-stranded DNA, annealing of primers, and extension of new DNA strands by DNA polymerase.

Q4. Why is Taq polymerase used in PCR?

Solution: Taq polymerase is thermostable, so it can withstand the high temperature used during denaturation step and still remain active.

Q5. What is downstream processing?

Solution: Downstream processing includes separation, purification and formulation of the desired product after completion of biosynthesis.

3. NEET PYQ-based Practice

Q1. What is the role of restriction enzymes in genetic engineering?

Solution: Restriction enzymes cut DNA at specific recognition sequences.

Q2. Which sequence is recognised by EcoRI?

Solution: EcoRI recognises the sequence GAATTC.

Q3. What is the function of an ampicillin-resistance gene in a cloning vector?

Solution: It acts as a selectable marker to identify transformants.

Q4. Which DNA fragments move farther in agarose gel electrophoresis: larger or smaller?

Solution: Smaller DNA fragments move farther and faster through the gel.

Q5. What is the role of DNA ligase in recombinant DNA technology?

Solution: DNA ligase joins DNA fragments by sealing the phosphodiester backbone.

Practice tip: First revise the short notes, then attempt CBSE board questions in written format, and finally solve the exam-specific section in timed mode.