

Biology Sample paper-2

Unit-IX : Biotechnology (PYQs)

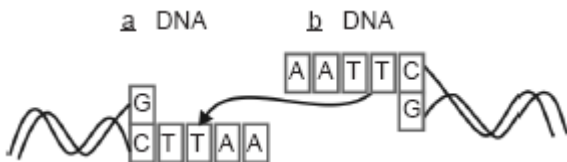
Max. Marks 35

Time allowed: 2 hours

General Instructions:

- All questions are compulsory.
- The question paper has three sections and 13 questions. All questions are compulsory.
- Section–A has 6 questions of 2 marks each; Section–B has 6 questions of 3 marks each; and Section–C has a case-based question of 5 marks.
- There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
- Wherever necessary, neat and properly labelled diagrams should be drawn.

Section-A



- Study the linking of DNA fragments shown above.
 - Name 'a' DNA and 'b' DNA.
 - Name the restriction enzyme that recognises this palindrome.
 - Name the enzyme that can link these two DNA fragments. 2
- List the four steps to isolate DNA from a bacterium. 2
- (a) Mention the number of primers required in each cycle of polymerase chain reaction (PCR). Write the role of primers and DNA polymerase in PCR.
(b) Give the characteristic feature and the source organism of the DNA polymerase used in PCR. 2
- Why does a patient of ADA-deficiency require repeated infusion of genetically engineered lymphocytes? Suggest a possible permanent remedy. 2
- Expand the following and mention one application of each: 2
 - PCR
 - ELISA

OR

- What is Biopiracy? State the initiative taken by the Indian Parliament towards it. 2
- Why do the toxic insecticidal proteins secreted by *Bacillus thuringiensis* kill the insect and not the bacteria itself? 2

Section-B

- Why is *Agrobacterium tumefaciens* a good cloning vector? Explain. 3
- Why is *Taq* polymerase preferred in PCR? Mention the source of this enzyme. 3
- What are bioreactors? List five growth conditions that a bioreactor provides for obtaining the desired product. 3
- How do antibiotic-resistance genes function as selectable markers? Explain with the help of *E.coli* cloning vector pBR 322. 3

OR

What are 'cloning sites' in a cloning vector? Explain their role. Name any two sites in pBR322.

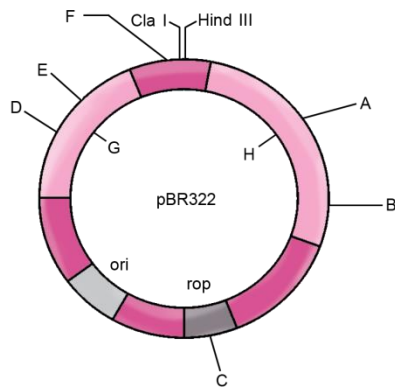
11. Describe any three potential applications of genetically modified plants. 3
12. How did an American Company, Eli Lilly, use the knowledge of rDNA technology to produce human insulin? 3

Section-C

13. Read the following passage and answer the questions that follow:

We know that plasmids and bacteriophages are the most commonly used vectors in biotechnology experiments. If we can link an alien piece of DNA to the plasmid DNA, the alien DNA can be multiplied equal to the copy number of the plasmid. Engineered vectors are used these days.

Study the diagram of the E.coli cloning vector pBR 322 and answer the questions that follow:



- (a) Identify and name two selectable markers.
- (b) Identify and name the restriction enzymes that can be used to ligate an alien DNA fragment at the tetracycline gene.
- (c) Identify the restriction sites of
- (i) EcoRI
 - (ii) Pvu II
- (d) Name the gene that controls the copy number of the vector in the host cell.
- (e) Mention the function of 'rop' gene in the vector.

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