

**2 MARKS EACH**

1. Name the source of the DNA polymerase used in the PCR technique. What is so special about it?
2. Name the enzymes that are used for isolating DNA from bacterial and fungal cells for recombinant DNA technology.
3. Name two commonly used bioreactors. State the importance of using a bioreactor.
4. Mention the role of 'ori' and restriction site in a cloning vector pBR322.
5. Mention the number of primers required in each cycle of PCR. Write the role of primers and DNA polymerase used in PCR.
6. Mention the role of vectors in rDNA technology. Give two examples.
7. Write any two ways to introduce the desired DNA segment into a bacterial cell in a recombinant technology experiment.
8. What are recombinant proteins? How do bioreactors help in their production?
9. How are 'sticky ends' formed on a DNA strand? Why are they so-called?
10. How has the development of bioreactor helped in biotechnology?
11. Why is it not possible for an alien DNA to become part of a chromosome anywhere along its length and replicate normally?

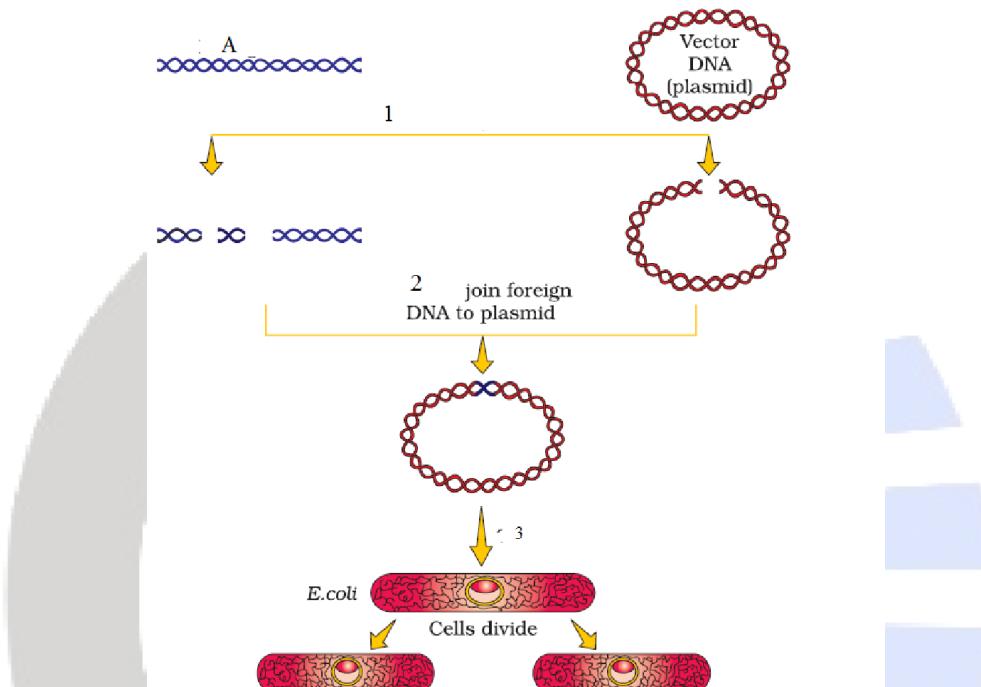
**3 MARKS EACH**

1. Give reasons
  - a. *Agrobacterium tumefaciens* a good cloning vector
  - b. Enzyme cellulase is not used for isolating genetic material from an animal cell.
  - c. DNA fragments move towards anode under the electric field.
2. How each of the following method is used for introduction of an alien DNA into host cells?
  - a. Microinjection
  - b. Gene gun method
  - c. Treatment with divalent cation
3. What are the three basic steps in genetically modifying an organism?
4. Which enzyme would you use to remove the cell wall of following organisms to isolate its DNA
  - a. Bacterial cell
  - b. Fungal cell
  - c. Plant cell.
5. How RNA and protein part is removed to get the desired DNA? And how is isolated DNA precipitated?
6. Draw a labelled diagram of plasmid pBR322.
7. What is 'insertional inactivation'? Explain using an example.
8. Draw a labelled diagram of a sparged stirred-tank bioreactor.

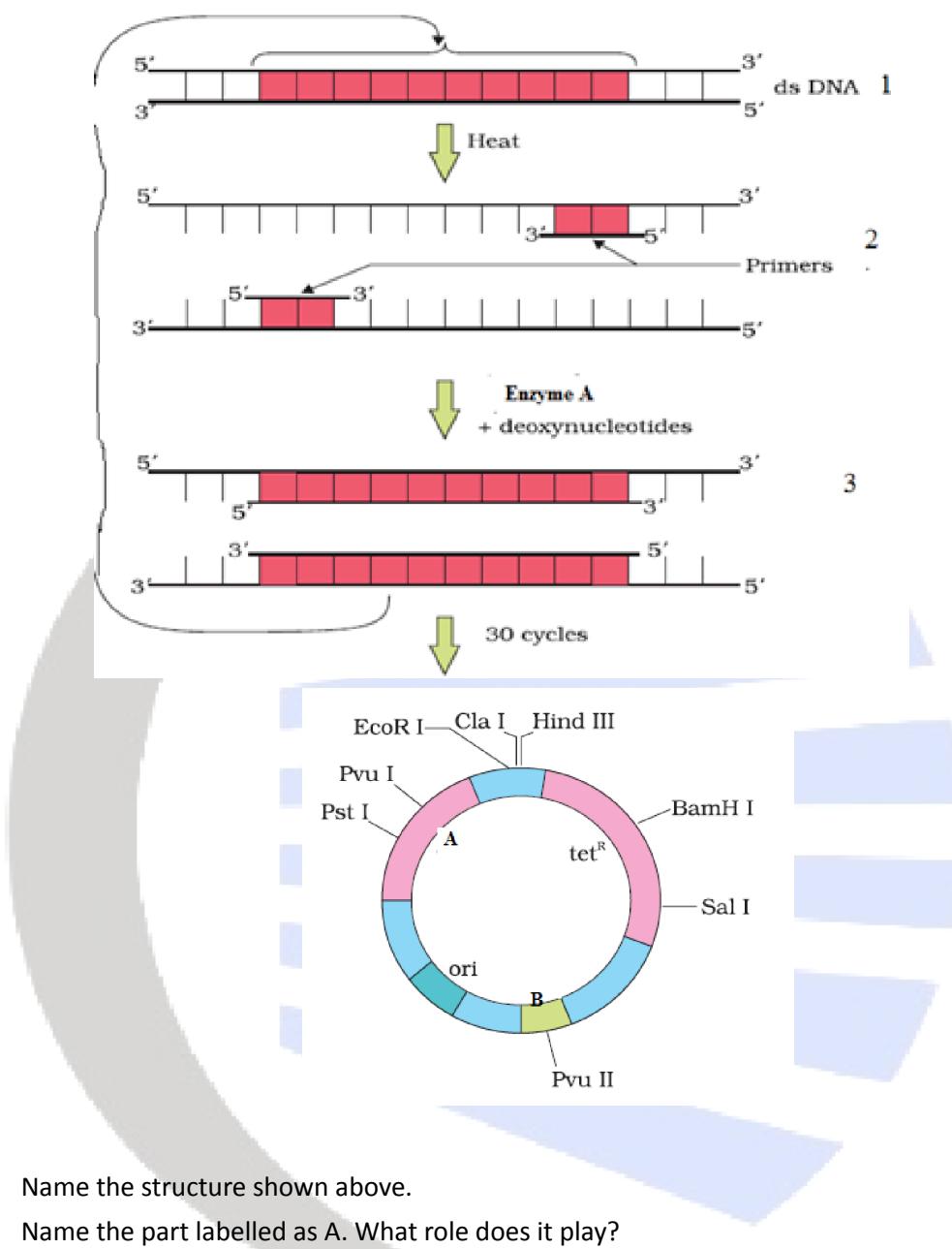
**3 MARKS EACH**

1. a. Name the technique used for separation of DNA fragments.  
b. Write the type of matrix used in this technique.  
c. How is the separated DNA visualised and extracted for use in recombinant technology?

2. How are Restriction Enzymes named? Explain the meaning of EcoRI.
3. a. Name a pathogen of several dicot plants that can transform normal plants cells into tumor cells.  
b. In case of animals, name the organism that performs the same function as above. State one use of such organism.
4. In the given figure



- a. Identify A
- b. Name the enzymes involved in steps 1 and 2.
- c. Name the step numbered as 3
- d. Which process or method is being shown here?
5. The given diagram display an important process/method that is used in rDNA technology.
  - a. Name the process/method shown here.
  - b. Label the steps 1,2,3
  - c. Name the enzyme A used in the process/method.



6. a. Name the structure shown above.  
 b. Name the part labelled as A. What role does it play?  
 c. What is B? Write its function.

**5 MARK EACH**

- For selection of recombinants, insertional inactivation of antibiotic marker has been superceded by insertional inactivation of a marker gene coding for a chromogenic substrate. Give reasons.
- Describe the role of *Agrobacterium tumefaciens* in transforming a plant cell.
- Illustrate the design of a bioreactor. Highlight the difference between a flask in your laboratory and a bioreactor which allows cells to grow in a continuous culture system.
- (a) Describe the characteristics a cloning vector must possess.

(b) Why DNA cannot pass through the cell membrane? Explain. How is a bacterial cell made competent to take up recombinant DNA from the medium?

5. (a) Why are engineered vectors preferred by biotechnologists for transferring the desired genes into another organism?  
(b) Explain, how do ori, selectable marker and cloning sites facilitate cloning into a vector?

6. Read the following base sequence of a certain DNA strand and answer the questions that follow:

	A	A	G	A	A	T	T	C	A	A	
	T	T	C	T	T	A	A	G	T	T	

a. What is called a palindromic sequence in a DNA?  
b. Write the palindromic nucleotide sequence shown in the DNA strand given and mention the enzyme that will recognise such a sequence to cut it.  
c. State the significance of enzymes that identify palindromic nucleotide sequences.

