BIOLOGY

BOOKS - NEW JYOTHI BIOLOGY (TAMIL ENGLISH)

BIOTECHNOLOGY : PRINCIPLES AND PROCESSES

Solutions To Ncert Exercises

1. Can you list 10 recombinant proteins which are used in medical practice ? Find out where they are used as therapeutics (use the internet).

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2. From what you have learnt, can you tell whether enzymes are bigger or DNA is bigger in molecular size ? How did you know ?

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3. What would be the molar concentration of human DNA can be studied by Electro-phoresis .

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4. Do eukaryotic cells have restriction endonucleases ? Justify your answer .

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5. Besides better aeration and mixing properties, what other advantages do stirred tank bioreactors have over shake flasks ?

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6. Collect 5 examples of palindromic DNA sequences by consulting your teacher. Better try to create a palindromic sequence by following base-pair rules

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7. Can you recall meiosis and indicate at what stage a recombinant DNA is made ?

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8. Describe briefly the following :

a. Origin of replication

b. Bioreactors

c. Downstream processing

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9. Explain briefly

a. PCR

b. Restriction enzymes and DNA

c. Chitinase

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10. Discuss with your teacher and find out how to distinguish between

a. Plasmid DNA and Chromosomal DNA

b. RNA and DNA

c. Exonuclease and Endonuclease

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New Evaluation Type Questions

1. By observing the given pair fill up the blanks

a. Cutting DNA : Restriction endonuclease : : Joining DNA : . . . .

b. i. Chitiase : Fungus : : Cellulose : . . . .

c. Protein : Protease : : RNA : . . . .

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2. If mosquito acts as insect vector to transfer the malarial parasite into human body , what is used to deliver an alien piece of DNA into host cell ?

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3. Restriction endonucleases are used to cut DNA at specific sites. Name the first endonuclease isolated from Escherichia coli

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4. Name two important cloning vectors .

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5. Match the words in box 'A' with the most accurate answers from box 'B'

A	B
i. Lysozyme	a. T-DNA
ii. Agrobacterium tumifaciens	b. DNA stain
iii. Gel electro-phoresis	c. Escherichia coli
iv. Ethidium bromide	d . Restriction enzymes
v. Eco Ri	e. Bacterial cell breakage
vi. Molecular scissors	f. Separation of DNA fragments

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6. Biotechnology deals with techniques of using live organisms or enzymes from organisms to prodice products useful to humans . Explain briefly the two core techniques that enabled the birth of modern biotechnology

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7. Explain the merits of genetic engineering when compared to traditional hybridisation procedures .

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8. Explain the three basic steps in genetically modifying an organism.

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9. Genetic engineering leads to the production of desired products, which can be accomplished with the help of certain tools. Name the important tools of genetic engineering .

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10. Eco RI is the name of a restriction endonuclease. What does 'E' , 'co', 'R' and 'I' mean ?

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11. Palindromic nucleotide sequences have significance in recombinant DNA techonology. Explain. Give example for a palindromic DNA sequence .

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12. During genetic engineering DNA fragments are produced by cutting DNA with endonucleases. These fragments are further used for Producing recombinant DNA. Explain the technique and principle that help to sepa-rate these DNA fragments .

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13. Separation and isolation of DNA fragments is a major event in recombi-nant DNA technology . The separated fragments cannot be seen in a nor-mal way . Is there any method to visualise the separated DNA ? Explain .

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14. How are the DNA fragments separated through gel electrophoresis ex-tracted ?

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15. Name two important cloning vectors .

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16. What are the main features that are required to facilitate cloning into a vector ?

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17. Explain the significance of origin of replication and selectable market in gene cloning experiments .

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18. Name any three suitable 'selectable marker' for E.coli.

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19. During genetic engineering experiments recombinants are distinguished from nonrecombinants by different methods . One of the methods is know as insertional inactivation . Explain the process.

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20. DNA is a hydrophilic molecule, so it cannot pass through cell membranes. Then how does a recombinant DNA inserted into a plasmid vector, enter into a bacterial cell ?

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21. Number of recognition sites usually preferred for a vector is

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22. You are provided with the mixture of transformed bacteria having recom-binant plasmids in which a foreign DNA is linked at the sits of tetracy- cline resistance and non transformed bacteria . How will you select the recombinant plasmids from the mixture ?

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23. Agrobacterium tumifaciens act as a natural genetic engineer , who trans-forms normal plant cells into tumors. Justify the statement .

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24. Given below are the different steps in recombinant DNA technology. Arrange them according to the sequence of occurrence .

a. Transferring the recombinant DNA into the host

b. Extraction of the product

c. Fragmentation of DNA by restriction endonucleases

d. Ligation of DNA fragment into a vector

e. Isolation of DNA

f. Culturing the host cells in a medium at large scale .

g. Isolation of a desired DNA fragment .

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25. DNA is usually intertwind with histone proteins and RNA. But in genetic engineering experiments DNA must be isolated in very pure form . How is this possible ?

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26. Briefly explaing the 'cutting' and 'ligation' of DNA during recombinant DNA technology or how is recombinant DNA produced ?

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27. One of the methods by which recombinant DNA can be introduced into host cell is by 'heat shock' treatment (electro-poration). Write down other three important methods by which we can introduce alien DNA into host cells .

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28. Explain how the gene of interest is amplified invitro during biotechno-logical experiments .

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29. What is the significance of thermostable DNA polymerase during PCR ? From where is this DNA polymerase extracted ?

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30. Distinguish between recombinant DNA and recombinant protein.

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31. Give the significance of using a 'bioreactor' in biotechnological experiments. Which is the commonly used type of bioreactor ?

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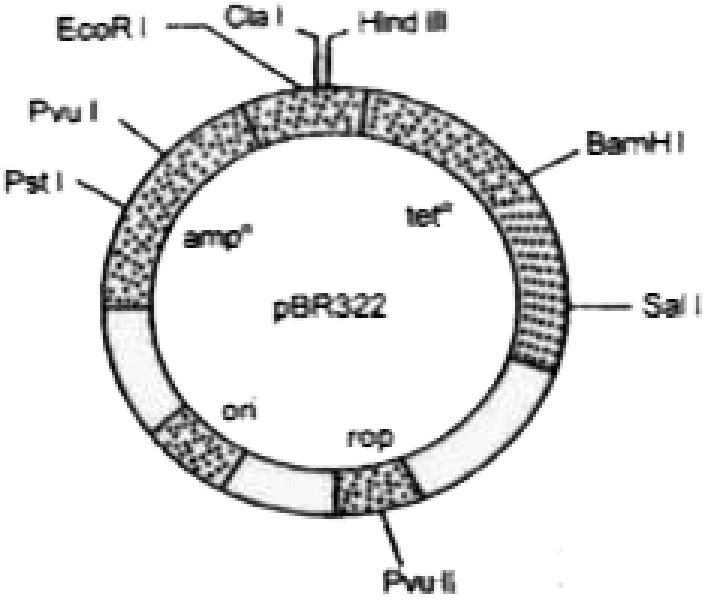
32. Explain the importance of (a) ori, (b) amp^R and (c) rop in the E. coli vector shown below .



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Questions From Previous Hse

1. Rinku with a circular DNA contains sequence

5' ← GGATTCC → 3'

3' ← CCTTAAGG → 5'

She wishes to add a new segment of DNA into it.

a. Identify the technology she planned.

b. Suggest the specific enzyme to make a cut in the DNA with above sequence.

c. Name the ctegory of enzyme your suggested.

d. How this enzyme identifies the sequence?

e. Draw the cut ends of the DNA with sequence.

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2. Rashid isolated a natural plasmid from a bacterium and is planning to facilitate cloning .

a. What are the minimum requirements for considering the isolated plas-mid as a vector ?

How he identifies whether a foreign DNA is inserted or not after clon-ing ?

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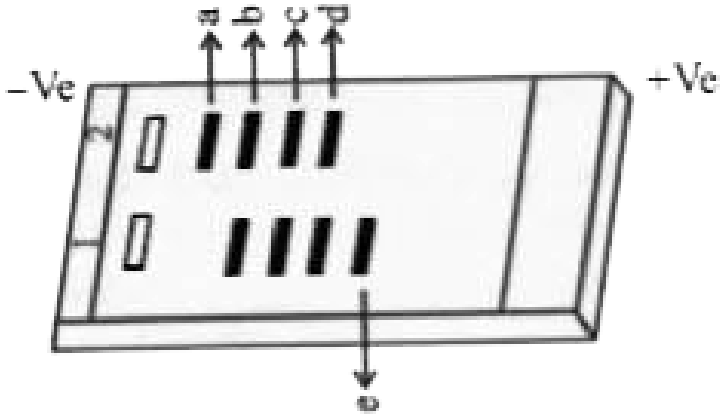
3. Diagram shows a typical agarose gel showing migration of DNA fragments .



a. Which of the bands has the largest and smallest DNA fragments ?

b. How can you make fragments of DNA for electrophoresis ?

c. Explain separation of DNA fragments using electrophoresis.

d. Point out a method to visualize the separated DNA fragments after electrophoresis .

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Previous Entrance Exam Corner

1. A restriction enzyme called ECORI from E. coli is expected to cleave DNA at the following sequence .

A. AAGTTC

B. GAATTC

C. AAGCTT

D. GTATATC

Answer: B

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2. ANDi is the cloned

A. sheep

B. bull

C. monkey

D. cat

Answer: C

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3. The enzyme used to cut the DNA molecule is

A. restriction endonucleases

B. 2- galatosidase

C. DNA- ligases

D. DNA - polymerases

Answer: A

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4. What does Bt stand for in the popular crop Bt cotton

A. Biotechnology

B. Best type

C. Bacillus tomentosa

D. Bacillus thuringenesis

Answer: D

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5. The vector for T-DNA is

A. Thermus aquaticus

B. Salmonella typhimurium

C. Agrobacterium tumefaciens

D. Escherichia coli

Answer: C

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6. Which of the following is a plasmid ?

A. pBR 322

B. Bam H I

C. Sal I

D. Eco RI

Answer: A

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Cbse Corner

1. The enzyme used to cut the DNA molecule is

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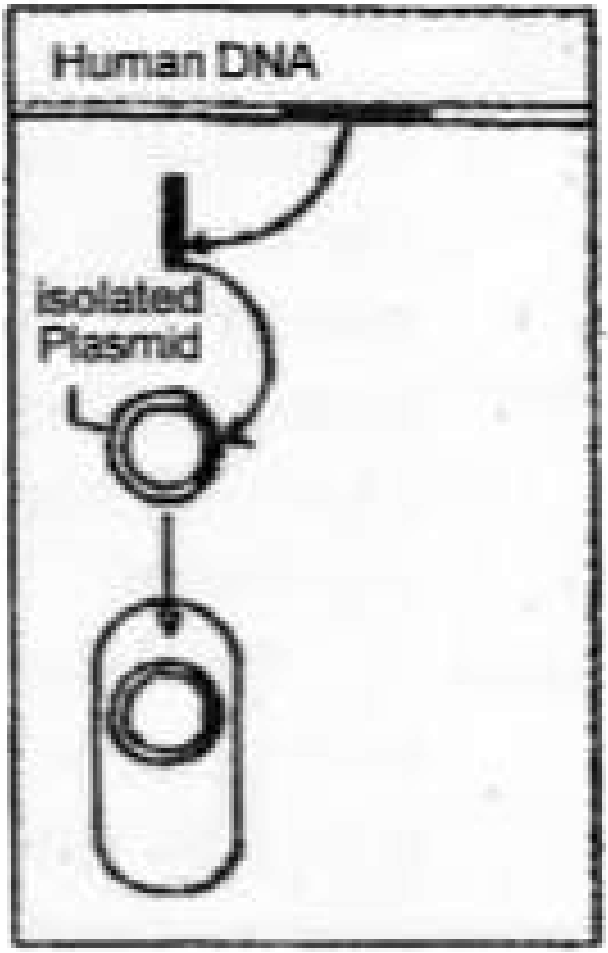
2. Name the particular technique in biotechnology whose steps are shown in the figure . Use the figure to sum - marise the

techique in three steps .



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3. Name any two cloning vectors. Describe the features required to facilitate clon-ing into a vector .

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4. State the principle underlying 'gel electrophoresis' and mention the applica-tion of this technique in biotechnology .

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5. How has Agrobacterium tumifaciens been suitably modified to act as a clon-ing vector ?

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6. An intersting property of restriction enzymes is molecular cutting and past-ing. Restriction enzymes typically recognize a symmetrical sequence of DNA .

Notice that the top strand is the same as the bottom strand, but reads backward . When the enzyme cuts the strand between G and A, it leaves over-hanging chains

a. What is this symmetrical sequence of DNA known as ?

b. What is the significance of these overhanging chains ?

c. Name the restriction enzyme that cuts the strand between G and A.

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7. How and why is the bacterium Thermus aquaticus employed in recombinant DNA technology ? Explain .

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8. a. What are molecular scissors ? Give one example .

b. Explain their role in recombinant DNA technology .

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9. Mention the role of vectors in recombinant DNA technology . Give any two examples .

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10. Why is Agrobacterium tumefaciens a good cloning vector ? Explain ?

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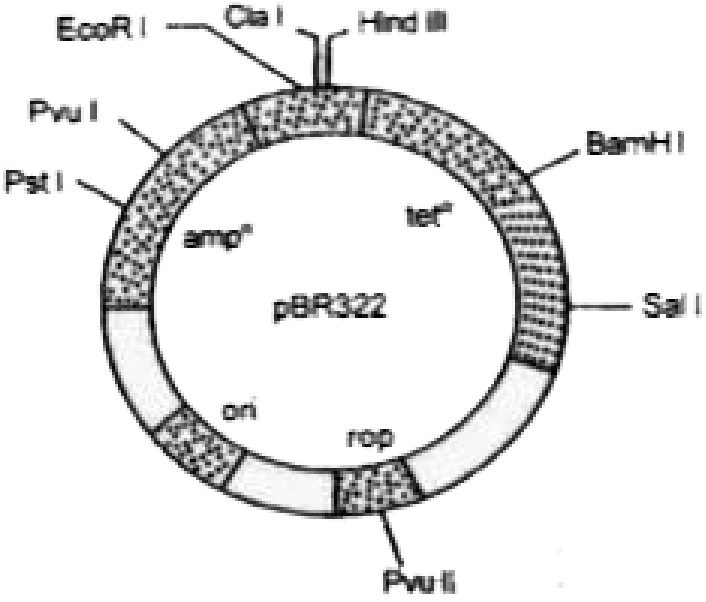
11. Explain the importance of (a) ori, (b) amp^R and (c) rop in the E. coli vector shown below .



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12. If a certain plant when introduced into new environment neither produces seeds nor it responds to vegetative reproduction (Propagation), how can more plants be produced of its kinds from this plant ? State the method .

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